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PHYSICAL, NUTRIENT AND BIOLOGICAL MEASUREMENTS OF COASTAL WATERS OFF CENTRAL CALIFORNIA IN MARCH 2012

by

Thomas A. Rago, Reiko Michisaki, Baldo Marinovic and Marguerite Blum

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7600 Sand Point Way NE
Seattle, WA 98115

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NAVAL POSTGRADUATE SCHOOL
Monterey, California 93943-5000

Daniel T. Oliver
President

Leonard A. Ferrari
Executive Vice President and
Provost

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This report was prepared by:

Thomas A. Rago
Oceanographer

Reiko Michisaki
Oceanographer

Baldo Marinovic
Research Biologist

Marguerite Blum
Oceanographer

Reviewed by:

Peter C. Chu
Chairman,
Department of Oceanography

Released by:

Jeffrey D. Paduan
Vice President and
Dean of Research

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Thomas A. Rago, Reiko Michisaki, Baldo Marinovic, and Marguerite Blum

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14. ABSTRACT

The results of analyses of hydrographic, nutrient, and biological data collected in coastal ocean waters off Central California in March 2012 aboard the *R/V Point Sur* are presented in both tabular and graphical form. The cruise departed from Moss Landing, California, and proceeded offshore along CalCOFI Line 67 to station 90. Additionally, ancillary Expendable Bathythermograph (XBT), *A*dvanced *V*ery *H*igh *R*esolution *R*adiometer (AVHRR) satellite imagery, *A*coustic *D*oppler *C*urrent *P*rofiler (ADCP), and *U*nderway *D*ata *A*cquisition *S*ystem (UDAS) meteorological and surface oceanographic data are also included in this report.
The CTD and XBT data can be found on the NODC Website with accession #0098772.

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Introduction

Following in a long tradition of hydrographic studies of the California Current system-- see, for example, Steger *et al*. (2000) and Collins *et al*. (2003)-- the data in this report were collected during the 27-30 March 2012 cruise of the *Pa*cific *C*oast *O*cean *O*bserving *S*ystem (PaCOOS) program aboard the *R/V Point Sur*. The PaCOOS program was organized in 2003/2004 as the NOAA west coast contribution to the national *I*ntegrated *O*cean *O*bserving *S*ystem (IOOS), and is charged with "providing ocean information for the sustained use of the California Current Large Marine Ecosystem under a changing climate."[1] PaCOOS cruises generally subsample the standard *Cal*ifornia *C*ooperative *O*ceanic *F*isheries *I*nvestigations (CalCOFI) grid of hydrographic stations (Figure 1). This PaCOOS cruise did exactly that, sampling along CalCOFI line 67 from Moss Landing, California, to station 90 [CTD casts 1-19] (Figure 2). To increase the resolution of the hydrographic data and to maintain the convention of similar recent PaCOOS cruises (Rago *et al.*, 2006, 2007a, 2007b, 2007c, 2008a, 2008b, 2009, 2011a, 2011b), eight CTD casts were also inserted between the standard CalCOFI sites along line 67 (Figure 2).

Participants on the cruise came from the Naval Postgraduate School (Physical Oceanography, Nutrient Analysis), the Monterey Bay Aquarium Research Institute (Nutrient Analysis, Primary Productivity), University of California at Santa Cruz (Zooplankton Analysis), and Moss Landing Marine Laboratories (Nutrient Analysis).

Standard Procedures

CTD/Rosette Data:

At each site a Sea-Bird Electronics, Inc., Conductivity-Temperature-Depth (CTD) instrument fitted with a 12-place rosette was deployed. The rosette was equipped with 12 10-liter PVC Niskin bottles for collection of water samples. The CTD was lowered to 1000 meters or the bottom (whichever came first), except that the CTD was lowered to near the bottom at the offshore site at the end of the CalCOFI line 67. Where primary productivity sampling was performed, water samples were taken at depths designed to maximize resolution of the variables sampled throughout the thermocline. Otherwise, water samples were collected so as to aid in the later conductivity/salinity calibration of the CTD conductivity sensors. A water sample was always obtained at or near the bottom of each CTD cast for that later conductivity/salinity calibration.

Besides temperature (dual sensors), conductivity (dual sensors), and pressure, the CTD also measured fluorescence, transmissivity, dissolved oxygen content, and photosynthetically available radiation (PAR) in the water column. Except for PAR and the secondary of the dual sensors, all these parameters are reported here.

[1] http://www.pacoos.org

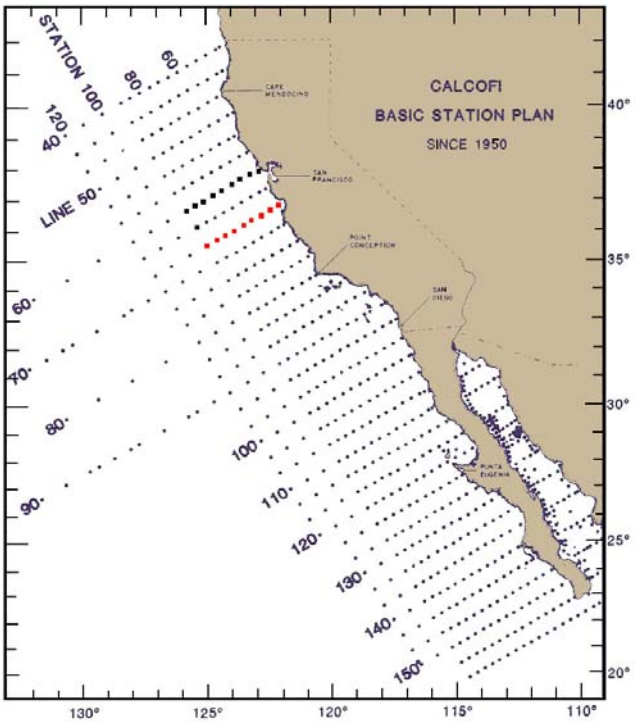

Figure 1: *Full CalCOFI hydrographic station grid.* Stations occupied during the PaCOOS cruise of March 2012 are highlighted in red.

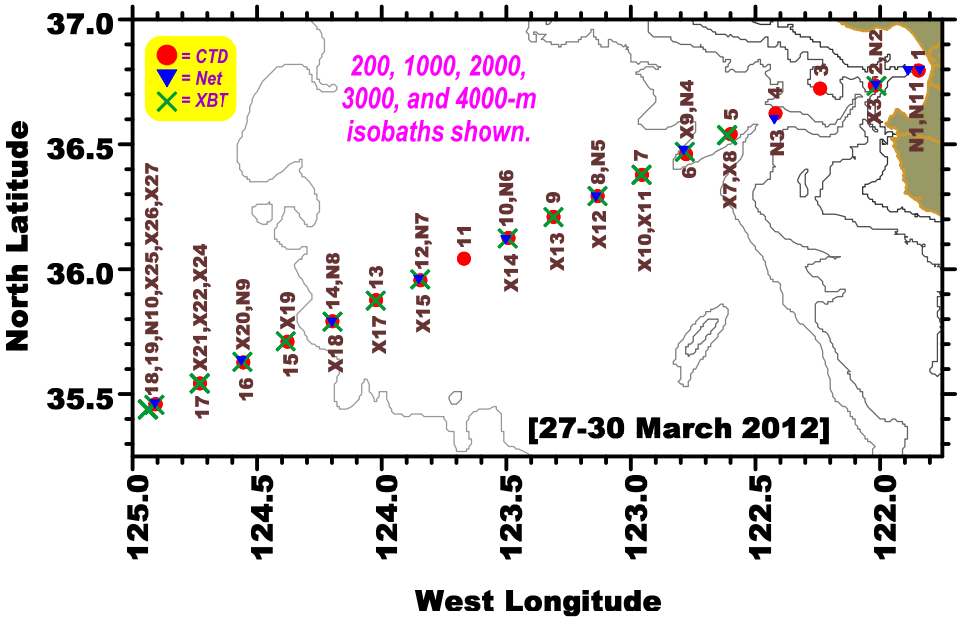

Figure 2: *Hydrographic stations occupied during the PaCOOS cruise of March 2012.* Also shown are XBT stations sampled during the cruise. 200, 1000, 2000, 3000, and 4000 m isobaths are shown. Net tows were completed at casts 1, 2, 4, 6, 8, 10, 12, 14, 16, and 18/19.

During this particular cruise, there were technical difficulties using the CTD. The primary problems showed up in the transmissivity data, which were very electronically noisy, often registered values at depth that seemed unrealistically low, and frequently registered values significantly greater than the instrument's "clear water" value of 91.3%. (The first and, particularly, the last symptoms indicated we had a problem.) The transmissometer was changed for CTD cast 3; but this did not solve the problems. It was not until CTD cast 12 that we finally discovered the problem: serious corrosion on pin 1 of the bulkhead connector. Switching to a different bulkhead connector finally solved the transmissometer issues. Unfortunately, as is reflected in the CTD data Table A2 and Figure 11, this means that there were no good transmissivity data prior to CTD cast 12. The oxygen sensor also failed below 1500 dbars. Since only the deep CTD cast 19 was lowered below 1000 dbars, however, oxygen data were only lost during this single CTD cast.

Generally, a minimum of two salinity samples (including the bottom-of-cast sample) were collected from each CTD cast. These samples were analyzed after the cruise at the Naval Postgraduate School (NPS) using a Guildline model 8400B Autosal salinometer. Regressions between the salinometer results and the conductivities measured by the CTD at the times the Niskin bottles were tripped were made, from which corrections to the CTD salinities were determined and then applied for the CTD. The salinometer was standardized using IAPSO Standard Seawater (batch P153) before and after each set of water samples was analyzed. Salinity values were calculated using the algorithms for the Practical Salinity Scale, 1978 (UNESCO, 1981).

Dissolved oxygen (Winkler) samples were collected at CTD stations 2, 6, 10, 16, 17, and 19. These were analyzed after the cruise at MBARI. The CTD for this cruise was outfitted with a Sea-Bird Electronics, Inc., SBE 43 oxygen sensor. This sensor is a polarographic membrane that outputs a voltage proportional to the temperature-compensated current flow occurring when oxygen is reacted inside the membrane. Dissolved oxygen concentration is then calculated from a modified version of the algorithm by Owens and Millard (1985). The results of the analysis of the Winkler oxygen samples were compared to the corresponding oxygen values recorded by the CTD. Using the method described in SBE Application Note #64-2[2], we calculated new SBE 43 sensor coefficients. Corrected CTD oxygen values were then recalculated with the modified version of the Owens and Millard (1985) algorithm using the new sensor coefficients. The one caveat, of course, is that there were no good oxygen values below 1500 dbars (regardless of the set of sensor coefficients used) for the reason stated previously.

For this cruise, the CTDs were fitted with SeaTech[3] 25-cm. transmissometers. This instrument is designed to measure beam transmission over a 25 centimeter water path using a modulated Light Emitting Diode (660 nm, in this case) and a synchronous detector. The temperature compensated transmissometer is not sensitive to ambient light. (For further details concerning the SeaTech transmissometer, the introduction from its operating manual is reprinted in Appendix C.)

Often, deck values are collected during a cruise to allow correction for instrumental drift over time with a SeaTech transmissometer. That was not done during this cruise. Instead, an alternate method was used to correct for instrumental drift. For CTD casts to at least 1000 dbars[4], it was assumed that the CTD always reached effectively "clear" water. According to its operating manual, the transmissometer should measure "clear" water as 91.3% transmissivity. The maximum

[2]See **Application notes** under the **Support** tab at http://www.seabird.com.
[3] SeaTech, Inc. was acquired by Wet Labs, Inc., in late 1998.
[4] In this case, because of the previously noted transmissometer issues, this only included every CTD cast after cast 11 except CTD cast 18, which was a shallow cast to 205 dbars.

measured transmissivity for each cast was plotted versus cast number (representing the chronological order of the casts), and a quadratic fit was made (Figure 3). From this fit, nominal measured transmissivity maxima were calculated for each cast, from which offsets from the nominal transmissivity of "clear" water (91.3%) were calculated for each cast (Table 1). Finally, offsets were applied to the CTD casts, giving the results shown in Figure 4.

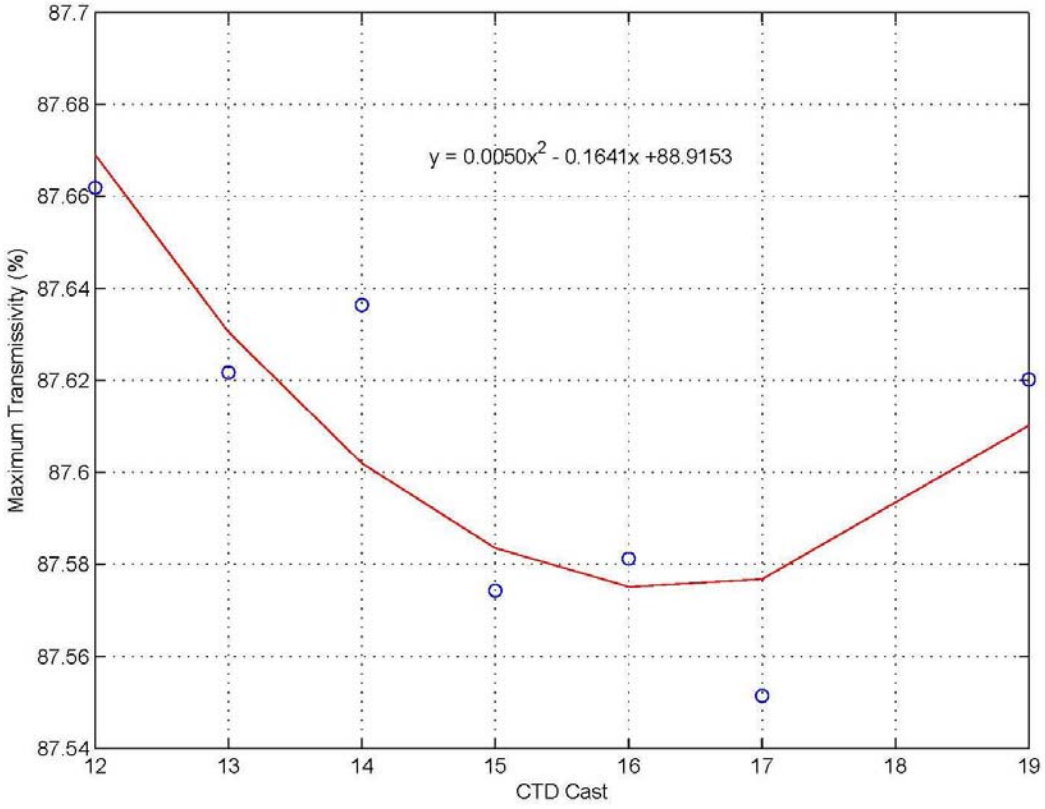

Figure 3: *Transmissivity maxima by CTD cast measured by the SeaTech 25-cm transmissometer during the PaCOOS cruise of March 2012.* A least squares quadratic fit was applied to the "good" data (casts 12-19).

Table 1: *Transmissivity offsets applied to each CTD cast during the PaCOOS cruise of March 2012. a* = shallow cast (did not reach "clear" water).

CTD Cast	Maximum Transmissivity (%) *(measured by CTD)*	Maximum Transmissivity (%) *(predicted from line fit)*	Calculated Transmissivity Offset (%) *(91.3% - predicted value)*
12	87.662	87.669	+3.631
13	87.622	87.631	+3.670
14	87.636	87.602	+3.698
15	87.574	87.584	+3.717
16	87.581	87.575	+3.725
17	87.551	87.577	+3.723
18	*a*	87.588	+3.712
19	87.620	87.610	+3.690

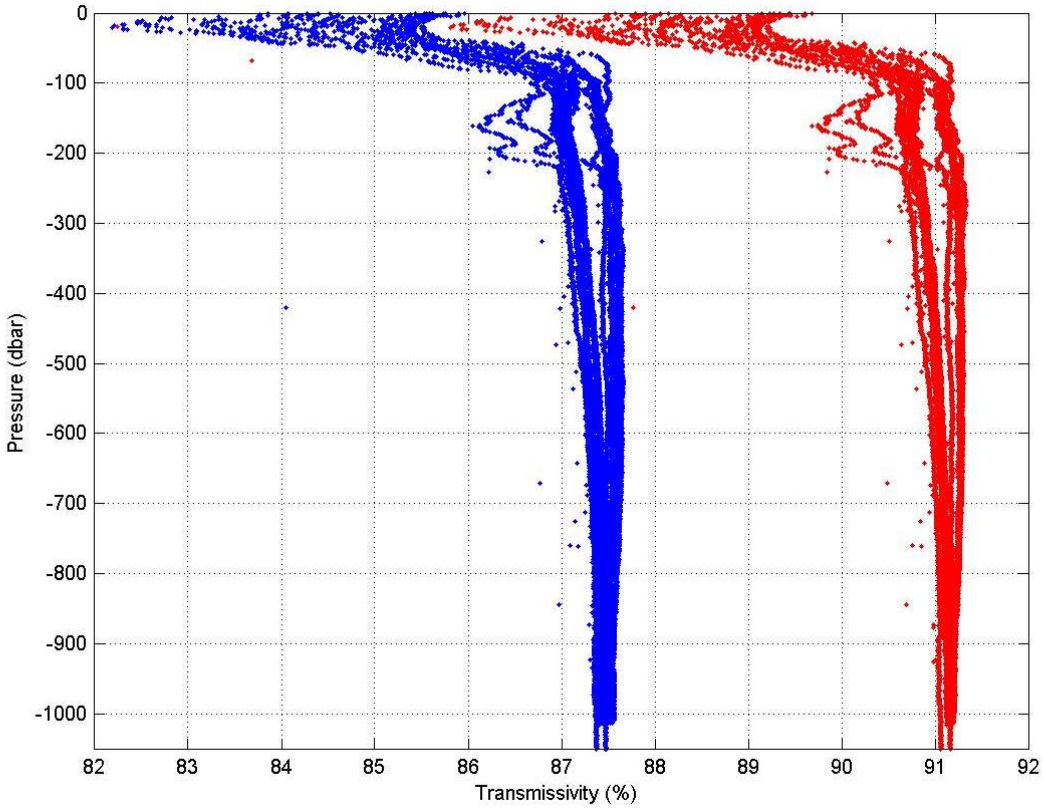

Figure 4: *Uncorrected **(blue)** and corrected **(red)** transmissivities.* This shows all the transmissivity measurements made during the PaCOOS cruise of March 2012 for CTD casts 12-19. The transmissometer failed prior to CTD cast 12—see text.

Nutrient samples were collected during the PaCOOS cruise in 45-ml polypropylene screw-capped containers, which were rinsed three times prior to filling. Samples were frozen and returned to MBARI for later analysis on an AlpChem autoanalyzer, as in Sakamoto *et al*. (1990).

Chlorophyll-*a* and phaeopigments were collected during the PaCOOS cruise in 280-ml polyethylene bottles and filtered onto 25-mm Whatmann GF/F filters. Chlorophyll-*a* was assayed with the standard fluorometric procedure of Holm-Hansen *et al*. (1965), modified such that phaeopigments are extracted in acetone in a freezer over at least 24 hours (Venrick and Hayward, 1984; Chavez *et al*., 1991). Analysis was performed as possible during the cruise or at MBARI immediately following the cruise.

Rather than report the raw instrumental voltages from the Wet Labs ECO AFL fluorometer[5] mounted on the CTD, we converted those voltages to real-world chlorophyll-*a* concentrations. Accordingly, we performed the regression between the collected nutrient samples and the fluorometer voltages at the times those samples were collected (Figure 5). The quadratic fit from these regressions was then applied to the full set of CTD fluorometer voltages to produce chlorophyll-*a* concentrations in $\mu g\ l^{-1}$.

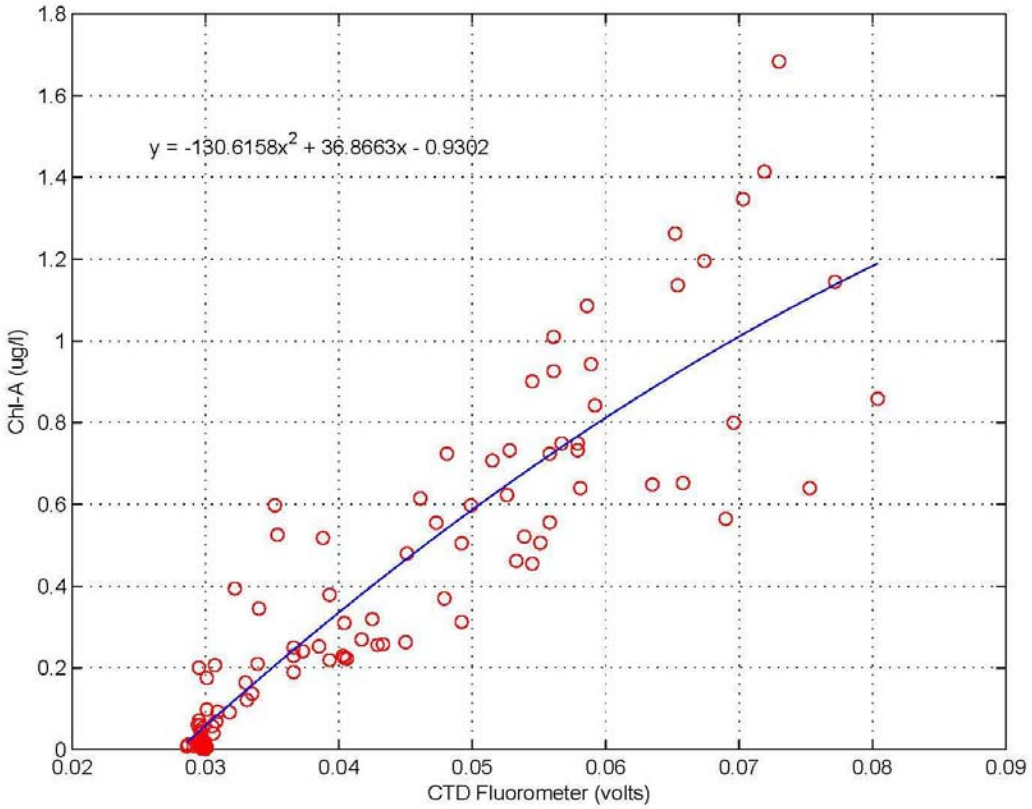

Figure 5: *Regression between CTD fluorometer voltage output and measured chlorophyll-*a *nutrient samples collected during the PaCOOS cruise of March 2012.*

[5] See http://www.wetlabs.com/products/pub/specsheets/flssy.pdf for specifications of the Wet Labs *E*nvironmental *C*haracterization *O*ptics (ECO) AFL single channel fluorometer.

Primary productivity during the PaCOOS cruise was estimated for the 100, 50, 30, 15, 5, 1, and 0.1% light penetration depths as determined by secchi, and followed the general method of Parsons *et al*. (1984). Water samples from the appropriate depths were collected in 280-ml polycarbonate bottles, spiked with ^{14}C, and incubated on deck for 24 hours under running seawater in plexiglass tubes wrapped with nickel-cadmium screens of differing pore size. (See Pennington and Chavez, 2000, for methodology details.)

Zooplankton Net Tows:

Ten stations[6] along CalCOFI Line 67, including the most inshore station twice, were sampled for zooplankton abundance during the cruise (Figure 2). All sampling was conducted with standard 0.7-m diameter paired bongo nets fitted with 505-mm mesh, which were towed obliquely to a depth of 210 m (or within 10 m of the bottom, whichever came first). Samples were preserved at sea according to standard protocols (Kramer *et al*., 1972) in 10% buffered formalin/seawater to be

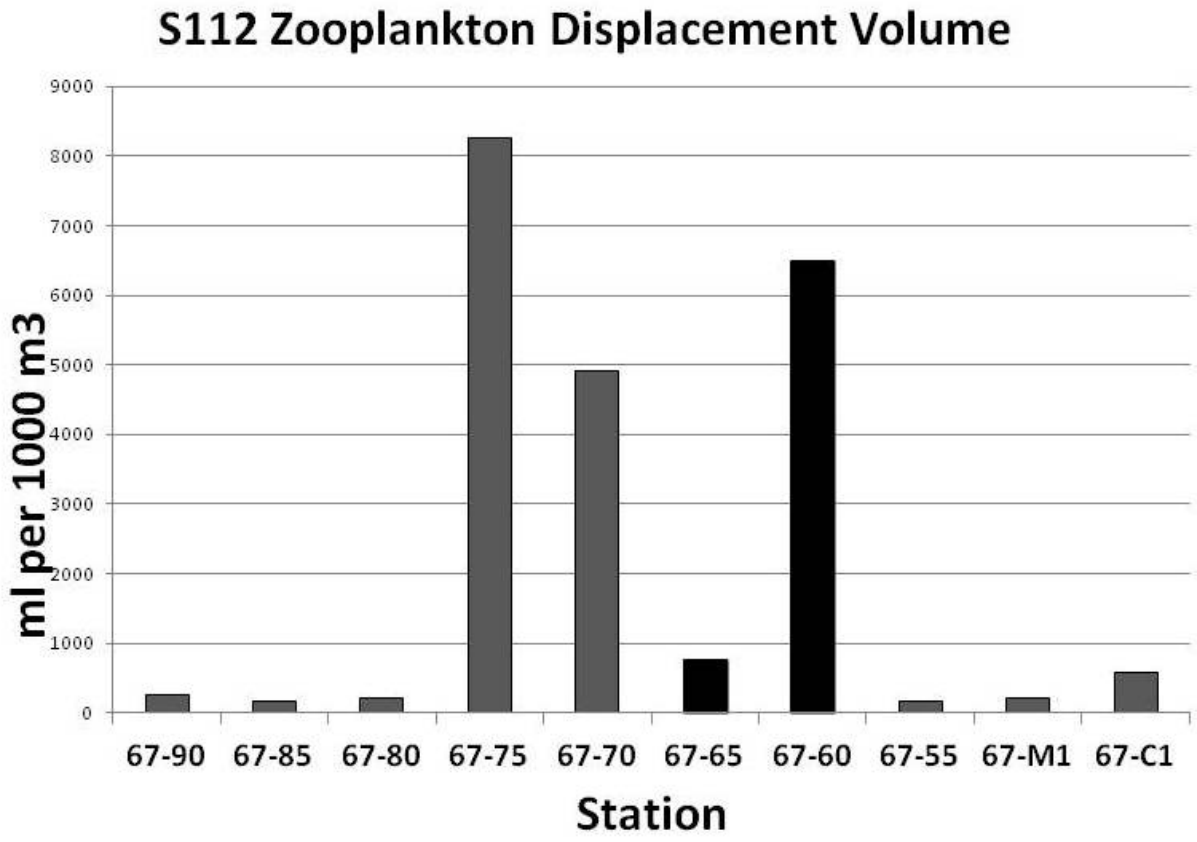

Figure 6: *Zooplankton volume displacements for Bongo net samples collected during the PaCOOS cruise of March 2012 along CalCOFI line 67.* Light (dark) gray bars indicate day (night) net tows, where day was 0600-1800 local time. Stations run from nearshore (right) to offshore (left).

[6] CTD stations 1 (twice), 2, 4, 6, 8, 10, 12, 14, 16, and 18/19.

subsequently analyzed in the laboratory at the University of California at Santa Cruz. Volume displacements were initially determined for all samples, while detailed analyses of euphasiids (krill) are currently being conducted. Figure 6 illustrates the offshore/onshore distribution of volume displacements for zooplankton samples. Unusually high volume displacements were measured for stations 67-75, 67-70, and 67-60 due to the large number of gelatinous zooplankters caught in these tows. These consisted primarily of thaliaceans, and included multiple blastozooids of *Salpa spp*. as well as several *Pyrosoma tuberculata* (pyrosome) colonies. Concurrent data on fluorescence (Figure 11) revealed an extensive moderate ($\leq$ 1 mg l^{-1}) band of chlorophyll associated with these stations, which likely promoted favorable conditions to support rapid growth via asexual budding for these taxa.

Ancillary Observations:

XBT: T7[7] Expendable Bathythermographs (XBTs) were launched concurrently at fourteen of the 18 CTD sites (Figure 2) from the starboard stern quarter of the *R/V Point Sur*. Results are shown in Figure 7, which has been drawn with the same ratio dimensions and the same color ranges used in Figure 10a to allow for easy comparison with the CTD temperature results. These XBT data, as well as the CTD data described earlier, are accessible from http://www.nodc.noaa.gov/General/getdata.html, the *N*ational *O*ceanographic *D*ata *C*enter (NODC) Web site, under accession #0098772.

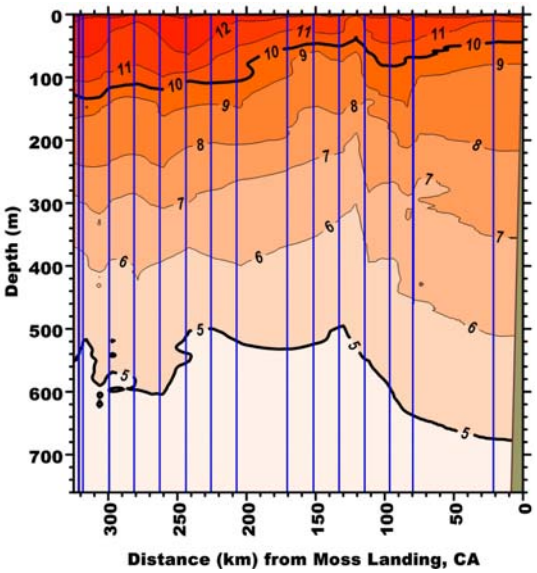

Figure 7: *Contours of temperature (^oC) determined from expendable bathythermographs (XBTs) along the line of hydrographic stations from Moss Landing, California, (on the right) to CalCOFI station 67-90 (on the left).* The blue lines indicate the locations of XBT data. The contour interval is 1^oC, with the 5^o and 10^oC contours highlighted.

[7] T7 XBTs: 760 m maximum depth, deployed at ship speeds up to 15 knots with a vertical resolution of 65 cm and rated accuracy of $\pm 0.1^oC$. Manufactured by Lockheed Martin Sippican in Marion, MA.

Underway Data: Near surface measurements of temperature and salinity were recorded throughout the cruise from water pumped through the ship's uncontaminated seawater system. These data were recorded at approximately 60-second intervals throughout the PaCOOS cruise. Table A1 lists these data at the start of each hydrographic station.

Satellite Imagery: Advanced Very High Resolution Radiometer (AVHRR) satellite imagery of sea surface temperature of the area of operation during the PaCOOS cruise of March 2012 is included as Figure 8.

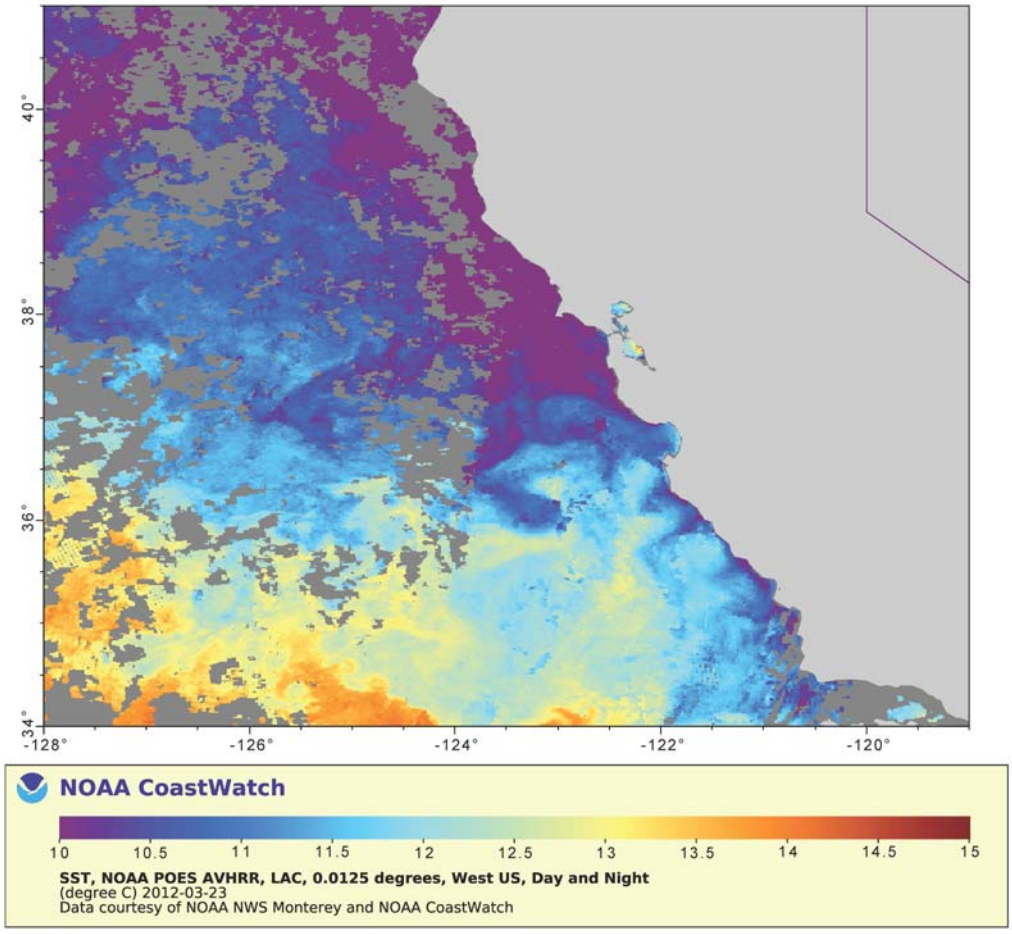

Figure 8: *Advanced Very High Resolution Radiometer (AVHRR) satellite imagery of sea surface temperature (^{o}C) of the area of operation during the PaCOOS cruise of March 2012.* This image was taken on 23 March 2012.

ADCP: Continuous ocean current measurements were made throughout the PaCOOS cruise using a vessel-mounted RD Instruments 75 kHz broadband *A*coustic *D*oppler *C*urrent *P*rofiler (ADCP). Some results from the ADCP are shown in Figure 9.

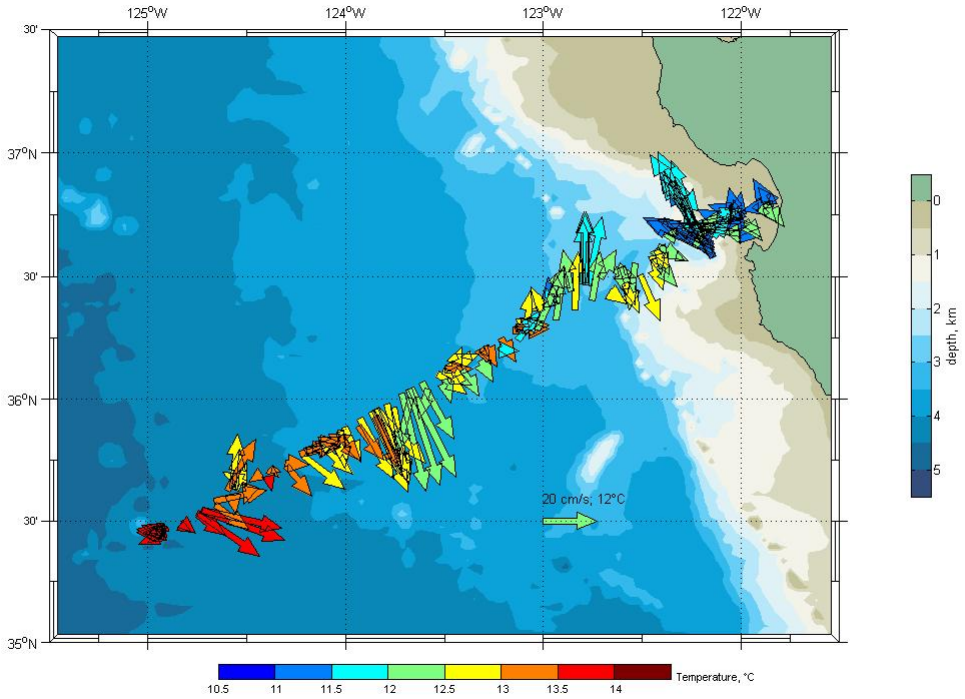

Figure 9: *Acoustic Doppler Current Profiler (ADCP) results from the PaCOOS cruise of March 2012.* The arrows are current vectors for currents averaged between 50 and 100 m. The colors of the current vectors reflect the sea surface temperature as measured (nominally at 3 meters) by the ship's underway data acquisition system (UDAS).

Tabulated Data (*in Appendix A*)

The following tables of data can be found in Appendix A:

1) *Table A1: Meteorological and Sea Surface Data*
   This lists the meteorological and surface oceanographic conditions at the start of each hydrographic station as measured by the underway data acquisition systems of the *R/V Point Sur*.

2) *Table A2: Hydrographic Data*
   This is a chronological listing of the hydrographic data collected at each CTD station during the PaCOOS cruise of March 2012. Data are given for standard pressures, except that the last line of data for each site is the deepest pressure for that CTD cast. The surface pressure, listed as 0 dbar, is actually 1 dbar. Salinities and oxygens have been adjusted according to the calibration corrections determined

from the collected salinity and Winkler oxygen water samples, respectively. Transmissivities, except where there were no good data, have been adjusted according to the methods described earlier in this report. The time listed for each station is the beginning (UT) of the CTD cast. Units of geopotential anomaly ($\Delta\Phi$), potential density (σ_θ), and potential spiciness (π_θ) are J kg^{-1}, kg m^{-3}, and kg m^{-3}, respectively.

3) *Table A3: Nutrient and Primary Productivity Data*

This is a chronological listing of the results of the nutrient and primary productivity analyses of the water samples collected from the 12 Niskin bottles tripped at each hydrographic station during the PaCOOS cruise of March 2012. The time given is the start (UT) for each hydrographic station. The data for each hydrographic station are separated into up to three sections ("Physical and Chemical," "Biological," and "Integrated Values").

The physical oceanographic properties listed in the first seven and the last columns of the "Physical and Chemical" section of each station's data are the uncorrected values measured by the CTD at the times each Niskin bottle was tripped. Because they are uncorrected, these values may differ slightly from those listed in Table A2. Columns eight through twelve of this section give the nitrate (NO_3), nitrite (NO_2), ammonium (NH_4), phosphate (PO_4), and dissolved silicate (SiO_4) concentrations.

When included, the "Biological" section of each station's data give the results of the nutrient and primary productivity analyses, while the "Integrated Values" section sums the nutrient and primary productivity results over the water column to the depth at which light intensity reaches 1% of its surface value.

Figures of Results (*in Appendix B*)

Graphical representations of the data collected during this cruise follow the tabulated data in Appendix A.

Figure 10 is a series of four diagrams contouring (a) the temperature (^oC), (b) the salinity, (c) the density anomaly (kg m^{-3}), and (d) the oxygen (μmol kg^{-1}) fields along the line of hydrographic stations from Moss Landing, California, to CalCOFI station 67-90.

Figure 11 is a series of two diagrams that contours the fluorescence and transmissivity in the upper 100 dbars of the water column along the same line of hydrographic stations as in Figure 10 from Moss Landing, California, to CalCOFI station 67-90.

Figure 12 is a series of five diagrams contouring the (a) silicate (μM), (b) nitrate (μM), (c) nitrite (μM), (d) phosphate (μM), and (e) ammonium (μM) fields along the line of hydrographic stations from Moss Landing, California, to CalCOFI station 67-90.

Figure 13 is a series of three diagrams that contours the primary productivity (upper panel), chlorophyll-a concentration (middle panel), and primary productivity index (lower panel) in the upper 50 meters of the water column along the line of hydrographic stations from Moss Landing, California, to CalCOFI station 67-90. The primary productivity and primary productivity index were estimated for the 100, 50, 30, 15, 5, 1, and 0.1% light penetration depths as determined by secchi. These light penetration depths are indicated in the bottom diagram of the figure.

Cruise Participants

Scientist	Duties	Affiliation
Tim Pennington	Nutrients, Primary Productivity	Monterey Bay Aquarium Research Institute
Marguerite Blum	*Nutrients, Primary Productivity*	
Curt Collins (Chief Sci.)	Physical Oceanography	Naval Postgraduate School
Tarry Rago	*Physical Oceanography*	
Keith Wyckoff	Nutrients	
Tetyana Margolina	*Nutrients*	
LT Luke Penrose (USN)	Nutrients	
ENS Amber Payne (NOAA)*	Phytoplankton Net Tows	University of California, Santa Cruz
Cynthia Carrion	*Phytoplankton Net Tows*	
Ben Jokinen	Physical Oceanography	Moss Landing Marine Laboratories
Julie Kuo	*Nutrients*	
April Woods	Nutrients	

* Also affiliated with National Marine Fisheries Service.

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Appendix A

Table A1: *Meteorological and sea surface data collected during the PaCOOS cruise of March 2012.* Listed here are the meteorological and surface oceanographic conditions as measured by the *u*nderway *d*ata *a*cquisition *s*ystem (UDAS) of the *R/V Point Sur* at the beginning of each hydrographic station. Continuous measurements of the water being pumped through the ship's uncontaminated seawater system ("sea chest") from approximately 3 meters below the surface supplied the oceanographic data, while instrumentation atop the ship's mast supplied the meteorological data.

Station	Yearday, 2012 (UTC)	Barometric Pressure (mb)	Wind Speed (kts)	Wind Direction (°T)	Air Temp. (°C)	SST (°C)	SSS
1	87.6965	-----	19.10	137.41	11.50	10.769	33.515
2	87.8118	-----	18.39	096.06	12.08	10.953	33.467
3	88.3965	1015.36	14.16	184.13	11.95	11.432	33.089
4	88.5056	1014.80	11.41	206.59	12.69	12.182	32.920
5	88.6292	1016.48	7.97	169.23	12.50	11.980	32.954
6	88.7174	1017.64	4.77	189.39	12.29	11.704	32.874
7	88.8299	1018.12	5.65	246.68	12.42	11.228	33.120
8	88.9208	1017.93	5.71	201.76	12.82	12.756	33.385
9	89.0361	1017.39	2.28	169.88	13.12	13.073	33.275
10	89.1257	1017.87	4.87	216.14	12.81	12.641	32.925
11	89.2326	1018.78	6.11	213.43	12.74	12.106	32.895
12	89.3139	1018.97	11.60	258.33	12.15	12.527	32.961
13	89.4299	1018.07	13.48	230.28	11.84	12.545	32.856
14	89.5188	1017.72	13.07	212.15	12.60	13.105	32.976
15	89.6313	1018.28	15.20	251.95	12.73	12.955	32.929
16	89.7146	1018.60	6.83	227.92	12.64	12.477	32.842
17	89.8222	1018.90	12.23	254.32	13.29	13.459	32.824
18	89.9076	1017.14	21.33	276.68	13.60	13.500	32.902
19	89.9597	1017.89	2.04	345.84	13.96	13.410	32.972

Table A2: *List at standard pressures of hydrographic data collected during the PaCOOS cruise of March 2012.* Stations are in chronological order. For each cast, the surface pressure (listed as 0 dbar) is actually 1 dbar, while the last pressure is the deepest pressure of the cast. Salinities and oxygens have been adjusted according to the calibration corrections determined from the collected salinity and oxygen water samples. Transmissivities have been corrected as described in the main text. Missing/bad data have been omitted from this table—see main text. The time listed for each station is the beginning (<*mm/dd/yyyy*, *hhmm*> UTC) of the CTD cast. Units of geopotential anomaly ($\Delta\Phi$), potential density (σ_θ), and potential spiciness (π_θ) are J kg^{-1}, kg m^{-3}, and kg m^{-3}, respectively.

Station: 1 **Date:** 03/27/2012, 1643 **Lat.:** 36° 47.65 N **Long.:** 121° 50.54 W

P(dbar)	T(°C)	S	O_2(μm/kg)	Xmiss(%)	$\Delta\Phi$	σ_θ	π_θ
0	10.738	33.517	269.9	---	0.023	25.667	0.095
10	10.721	33.520	268.9	---	0.231	25.673	0.094
20	10.691	33.527	264.3	---	0.462	25.684	0.095
30	10.615	33.545	258.3	---	0.691	25.711	0.095
50	10.206	33.649	229.4	---	1.130	25.863	0.104
75	9.882	33.712	205.0	---	1.655	25.968	0.099
100	9.580	33.769	183.2	---	2.155	26.062	0.093
125	9.347	33.813	166.4	---	2.639	26.136	0.089
150	9.166	33.850	150.4	---	3.104	26.194	0.088
200	8.064	34.022	92.6	---	3.957	26.499	0.052
228	7.868	34.054	81.2	---	4.385	26.554	0.048

Station: 2 **Date:** 03/27/2012, 1929 **Lat.:** 36° 44.13 N **Long.:** 122° 01.27 W

P(dbar)	T(°C)	S	O_2(μm/kg)	Xmiss(%)	$\Delta\Phi$	σ_θ	π_θ
0	10.929	33.467	274.7	---	0.024	25.594	0.090
10	10.923	33.467	276.0	---	0.238	25.595	0.088
20	10.794	33.488	268.8	---	0.475	25.635	0.081
30	10.361	33.558	243.7	---	0.702	25.765	0.060
50	9.582	33.730	199.7	---	1.127	26.031	0.063
75	8.976	33.784	151.5	---	1.602	26.171	0.006
100	8.635	33.886	139.3	---	2.049	26.304	0.033
125	8.548	33.960	117.8	---	2.471	26.376	0.078
150	8.533	33.999	101.8	---	2.883	26.409	0.106
200	8.208	34.065	84.0	---	3.683	26.512	0.108
250	7.697	34.128	66.2	---	4.426	26.637	0.081
300	7.442	34.154	56.8	---	5.130	26.695	0.064
400	6.689	34.183	44.9	---	6.466	26.822	-0.018
500	6.146	34.221	36.5	---	7.697	26.924	-0.060
600	5.617	34.274	32.3	---	8.833	27.033	-0.085
700	5.008	34.334	28.8	---	9.879	27.153	-0.109
800	4.617	34.373	31.5	---	10.819	27.229	-0.123
900	4.306	34.405	32.7	---	11.712	27.288	-0.131
1000	4.041	34.433	33.4	---	12.562	27.339	-0.137
1016	4.031	34.434	33.4	---	12.694	27.341	-0.138

Station: 3 **Date:** 03/28/2012, 0931 **Lat.:** 36° 43.33 N **Long.:** 122° 14.40 W

P(dbar)	T(°C)	S	O_2(μm/kg)	Xmiss(%)	ΔΦ	σ_θ	π_θ
0	11.412	33.182	284.0	---	0.027	25.286	-0.048
10	11.369	33.197	282.9	---	0.267	25.306	-0.044
20	11.300	33.225	282.8	---	0.531	25.340	-0.035
30	11.247	33.257	281.8	---	0.793	25.375	-0.020
50	10.604	33.476	260.5	---	1.296	25.660	0.037
75	9.489	33.639	198.7	---	1.820	25.975	-0.025
100	9.029	33.792	150.2	---	2.301	26.170	0.021
125	8.986	33.877	129.9	---	2.756	26.243	0.081
150	8.714	33.966	108.9	---	3.192	26.355	0.108
200	8.230	34.049	91.6	---	4.003	26.495	0.098
250	7.959	34.137	67.4	---	4.760	26.606	0.127
300	7.378	34.131	61.4	---	5.479	26.685	0.037
400	6.871	34.181	46.5	---	6.829	26.796	0.005
500	6.180	34.221	35.0	---	8.079	26.920	-0.056
600	5.699	34.265	27.9	---	9.233	27.016	-0.082
700	5.222	34.314	24.5	---	10.304	27.112	-0.101
800	4.741	34.363	24.8	---	11.281	27.207	-0.117
900	4.394	34.403	25.7	---	12.186	27.277	-0.124
1000	4.192	34.424	28.4	---	13.045	27.316	-0.129
1015	4.131	34.431	28.8	---	13.171	27.328	-0.130

Station: 4 **Date:** 03/28/2012, 1208 **Lat.:** 36° 37.39 N **Long.:** 122° 25.18 W

P(dbar)	T(°C)	S	O_2(μm/kg)	Xmiss(%)	ΔΦ	σ_θ	π_θ
0	12.166	32.996	280.4	---	0.029	25.002	-0.052
10	12.171	32.996	281.1	---	0.295	25.001	-0.051
20	12.140	32.996	280.3	---	0.590	25.007	-0.057
30	12.009	33.043	281.6	---	0.882	25.068	-0.046
50	10.600	33.394	260.4	---	1.410	25.596	-0.029
75	9.811	33.601	209.2	---	1.971	25.893	-0.002
100	9.297	33.756	176.0	---	2.469	26.099	0.036
125	8.605	33.824	140.8	---	2.931	26.261	-0.021
150	8.380	33.950	123.2	---	3.358	26.395	0.044
200	8.129	34.074	87.1	---	4.149	26.530	0.103
250	7.824	34.108	73.9	---	4.897	26.603	0.080
300	7.328	34.163	54.4	---	5.603	26.718	0.055
400	6.664	34.195	41.7	---	6.918	26.835	-0.012
500	5.938	34.242	31.4	---	8.131	26.967	-0.069
600	5.495	34.302	25.7	---	9.229	27.069	-0.077
700	5.032	34.345	24.3	---	10.253	27.159	-0.098
800	4.596	34.385	24.6	---	11.198	27.240	-0.116
900	4.291	34.418	26.3	---	12.079	27.300	-0.123
1000	4.047	34.443	29.0	---	12.914	27.346	-0.129
1013	4.031	34.445	29.2	---	13.020	27.350	-0.129

Station: 5 **Date:** 03/28/2012, 1506 **Lat.:** 36° 32.40 N **Long.:** 122° 36.01 W

P(dbar)	T(°C)	S	O_2(μm/kg)	Xmiss(%)	ΔΦ	σ_θ	π_θ
0	11.950	33.015	283.6	---	0.029	25.057	-0.079
10	11.952	33.015	282.7	---	0.290	25.057	-0.079
20	11.948	33.015	282.3	---	0.579	25.058	-0.080
30	11.871	33.026	280.8	---	0.868	25.081	-0.086
50	10.587	33.287	255.6	---	1.410	25.515	-0.116
75	9.799	33.447	222.7	---	1.997	25.774	-0.126
100	9.253	33.700	168.9	---	2.519	26.062	-0.016
125	9.013	33.816	138.5	---	2.990	26.191	0.037
150	8.583	33.954	107.7	---	3.429	26.367	0.078
200	7.718	33.956	133.1	---	4.234	26.498	-0.051
250	7.562	34.065	82.5	---	4.988	26.607	0.012
300	7.398	34.142	60.3	---	5.697	26.691	0.048
400	6.415	34.180	41.5	---	7.013	26.856	-0.057
500	5.925	34.234	31.3	---	8.211	26.962	-0.077
600	5.388	34.290	25.3	---	9.309	27.073	-0.099
700	4.902	34.343	23.6	---	10.315	27.172	-0.114
800	4.548	34.384	24.7	---	11.251	27.245	-0.121
900	4.234	34.424	26.8	---	12.123	27.311	-0.124
1000	3.909	34.456	30.5	---	12.940	27.370	-0.133
1016	3.879	34.459	31.0	---	13.066	27.376	-0.134

Station: 6 **Date:** 03/28/2012, 1713 **Lat.:** 36° 27.67 N **Long.:** 122° 46.74 W

P(dbar)	T(°C)	S	O_2(μm/kg)	Xmiss(%)	ΔΦ	σ_θ	π_θ
0	11.599	32.954	287.5	---	0.029	25.075	-0.195
10	11.564	32.955	287.7	---	0.287	25.082	-0.201
20	11.654	33.029	286.7	---	0.573	25.123	-0.125
30	11.648	33.143	283.7	---	0.852	25.213	-0.035
50	11.026	33.233	266.2	---	1.381	25.397	-0.080
75	10.394	33.416	254.3	---	1.997	25.650	-0.048
100	9.810	33.511	233.6	---	2.556	25.823	-0.074
125	9.476	33.630	200.8	---	3.087	25.971	-0.035
150	8.833	33.825	148.0	---	3.568	26.227	0.015
200	7.970	33.932	123.7	---	4.417	26.443	-0.033
250	7.329	33.979	114.8	---	5.191	26.572	-0.090
300	6.596	33.984	105.3	---	5.915	26.677	-0.187
400	6.063	34.109	50.1	---	7.226	26.845	-0.158
500	5.612	34.219	31.7	---	8.411	26.989	-0.128
600	5.154	34.309	24.5	---	9.481	27.115	-0.112
700	4.772	34.357	23.5	---	10.453	27.198	-0.117
800	4.426	34.401	25.2	---	11.364	27.272	-0.121
900	4.143	34.432	27.9	---	12.213	27.327	-0.127
1000	3.850	34.462	31.4	---	13.015	27.381	-0.134
1014	3.826	34.465	31.8	---	13.124	27.386	-0.134

Station: 7 **Date:** 03/28/2012, 1955 **Lat.:** 36° 22.66 N **Long.:** 122° 57.34 W

P(dbar)	T(°C)	S	O_2(μm/kg)	Xmiss(%)	ΔΦ	σ_θ	π_θ
0	11.012	33.062	287.8	---	0.027	25.264	-0.218
10	10.908	33.060	288.8	---	0.269	25.281	-0.239
20	10.926	33.097	286.1	---	0.537	25.307	-0.206
30	10.417	33.161	271.9	---	0.795	25.447	-0.246
50	9.850	33.337	220.6	---	1.284	25.679	-0.205
75	9.165	33.592	172.1	---	1.823	25.991	-0.116
100	9.038	33.799	153.4	---	2.305	26.173	0.028
125	8.585	33.847	138.0	---	2.755	26.282	-0.006
150	7.916	33.878	148.3	---	3.176	26.407	-0.083
200	7.364	33.950	126.4	---	3.961	26.544	-0.107
250	7.190	34.015	90.1	---	4.702	26.620	-0.081
300	6.627	34.038	77.2	---	5.405	26.715	-0.140
400	5.770	34.101	49.1	---	6.688	26.875	-0.200
500	5.348	34.183	34.3	---	7.853	26.992	-0.187
600	4.773	34.257	25.5	---	8.914	27.117	-0.195
700	4.693	34.367	23.5	---	9.873	27.214	-0.119
800	4.391	34.412	26.0	---	10.763	27.284	-0.116
900	4.125	34.435	28.1	---	11.608	27.331	-0.127
1000	3.883	34.459	31.0	---	12.413	27.375	-0.133
1015	3.832	34.464	31.9	---	12.530	27.384	-0.134

Station: 8 **Date:** 03/28/2012, 2206 **Lat.:** 36° 17.56 N **Long.:** 123° 08.00 W

P(dbar)	T(°C)	S	O_2(μm/kg)	Xmiss(%)	ΔΦ	σ_θ	π_θ
0	11.985	33.245	287.7	---	0.027	25.229	0.111
10	11.318	33.250	292.2	---	0.265	25.356	-0.011
20	11.288	33.250	291.2	---	0.526	25.362	-0.017
30	11.075	33.346	287.6	---	0.783	25.475	0.019
50	9.938	33.578	246.9	---	1.242	25.853	0.003
75	9.139	33.796	147.4	---	1.738	26.155	0.042
100	8.765	33.904	120.5	---	2.190	26.298	0.067
125	8.585	33.956	106.3	---	2.615	26.367	0.080
150	8.219	33.983	106.0	---	3.023	26.445	0.045
200	7.542	34.000	103.8	---	3.795	26.558	-0.042
250	6.777	34.015	86.9	---	4.515	26.676	-0.137
300	6.367	34.052	67.0	---	5.195	26.760	-0.163
400	5.615	34.109	46.5	---	6.445	26.900	-0.213
500	5.041	34.168	35.0	---	7.590	27.016	-0.234
600	4.825	34.275	24.7	---	8.636	27.126	-0.175
700	4.670	34.354	23.0	---	9.598	27.206	-0.131
800	4.391	34.392	24.3	---	10.503	27.268	-0.132
900	4.025	34.419	26.3	---	11.349	27.329	-0.149
1000	3.816	34.457	31.4	---	12.149	27.381	-0.141
1016	3.770	34.461	31.9	---	12.273	27.388	-0.143

Station: 9 **Date:** 03/29/2012, 0052 **Lat.:** 36° 12.56 N **Long.:** 123° 18.61 W

P(dbar)	T(°C)	S	O_2(μm/kg)	Xmiss(%)	ΔΦ	σ_θ	π_θ
0	11.755	33.167	290.1	---	0.027	25.211	0.005
10	11.509	33.165	292.4	---	0.272	25.255	-0.044
20	11.433	33.172	290.6	---	0.542	25.275	-0.052
30	10.769	33.364	278.8	---	0.800	25.543	-0.022
50	9.787	33.373	231.8	---	1.270	25.718	-0.187
75	8.770	33.585	188.0	---	1.792	26.047	-0.185
100	8.245	33.789	175.7	---	2.248	26.288	-0.104
125	8.475	33.917	131.5	---	2.677	26.354	0.032
150	8.009	33.946	125.6	---	3.086	26.447	-0.016
200	7.420	33.980	116.7	---	3.858	26.559	-0.076
250	6.975	34.008	94.6	---	4.587	26.643	-0.116
300	6.546	34.039	74.3	---	5.282	26.726	-0.149
400	5.879	34.104	48.4	---	6.566	26.864	-0.185
500	5.332	34.145	39.5	---	7.755	26.964	-0.219
600	4.862	34.215	29.1	---	8.848	27.074	-0.213
700	4.674	34.336	23.0	---	9.839	27.192	-0.145
800	4.355	34.400	24.6	---	10.740	27.278	-0.130
900	4.103	34.430	27.2	---	11.586	27.329	-0.133
1000	3.808	34.454	30.2	---	12.385	27.379	-0.144
1017	3.770	34.458	30.6	---	12.517	27.386	-0.145

Station: 10 **Date:** 03/29/2012, 0301 **Lat.:** 36° 07.50 N **Long.:** 123° 29.49 W

P(dbar)	T(°C)	S	O_2(μm/kg)	Xmiss(%)	ΔΦ	σ_θ	π_θ
0	11.242	33.054	291.0	---	0.027	25.218	-0.182
10	11.036	33.055	293.4	---	0.272	25.255	-0.219
20	11.031	33.095	290.6	---	0.542	25.287	-0.189
30	10.874	33.299	280.5	---	0.803	25.474	-0.054
50	10.350	33.424	261.8	---	1.285	25.663	-0.049
75	9.107	33.498	189.5	---	1.831	25.926	-0.200
100	8.882	33.659	167.3	---	2.335	26.089	-0.108
125	8.573	33.834	143.0	---	2.793	26.274	-0.018
150	8.214	33.889	133.8	---	3.222	26.372	-0.030
200	8.071	34.032	93.5	---	4.025	26.506	0.061
250	7.078	33.993	106.4	---	4.776	26.618	-0.113
300	6.619	34.017	82.4	---	5.483	26.699	-0.158
400	5.983	34.130	45.7	---	6.777	26.872	-0.151
500	5.224	34.150	38.5	---	7.957	26.980	-0.228
600	4.780	34.230	26.7	---	9.036	27.095	-0.216
700	4.445	34.303	22.8	---	10.018	27.191	-0.195
800	4.276	34.375	23.3	---	10.925	27.266	-0.158
900	4.011	34.431	27.3	---	11.769	27.339	-0.141
1000	3.765	34.464	32.2	---	12.557	27.391	-0.140
1016	3.697	34.468	32.5	---	12.679	27.401	-0.144

Station: 11 **Date:** 03/29/2012, 0535 **Lat.:** 36° 02.51 N **Long.:** 123° 40.20 W

P(dbar)	T(°C)	S	O_2(μm/kg)	Xmiss(%)	ΔΦ	σ_θ	π_θ
0	12.076	32.955	289.2	---	0.030	24.986	-0.103
10	11.493	32.947	291.5	---	0.292	25.089	-0.220
20	11.153	32.915	291.6	---	0.576	25.125	-0.310
30	10.864	32.904	291.1	---	0.858	25.168	-0.372
50	10.719	33.380	273.0	---	1.378	25.565	-0.018
75	9.693	33.505	222.9	---	1.961	25.838	-0.097
100	9.470	33.668	196.4	---	2.485	26.002	-0.006
125	8.920	33.745	153.1	---	2.973	26.157	-0.003
150	8.451	33.874	136.9	---	3.418	26.324	-0.006
200	7.790	33.946	127.1	---	4.241	26.480	-0.049
250	7.202	33.993	105.0	---	4.999	26.601	-0.096
300	6.937	34.068	70.9	---	5.709	26.697	-0.074
400	6.277	34.114	50.8	---	7.031	26.822	-0.127
500	5.262	34.130	41.2	---	8.241	26.960	-0.239
600	4.872	34.251	26.2	---	9.322	27.101	-0.190
700	4.536	34.322	22.8	---	10.299	27.196	-0.171
800	4.365	34.386	23.9	---	11.201	27.266	-0.139
900	4.098	34.430	27.1	---	12.053	27.330	-0.133
1000	3.820	34.461	31.0	---	12.851	27.383	-0.138
1012	3.778	34.463	31.8	---	12.944	27.389	-0.140

Station: 12 **Date:** 03/29/2012, 0732 **Lat.:** 35° 57.53 N **Long.:** 123° 50.70 W

P(dbar)	T(°C)	S	O_2(μm/kg)	Xmiss(%)	ΔΦ	σ_θ	π_θ
0	12.478	32.920	283.8	87.9	0.031	24.883	-0.052
10	12.064	32.923	287.8	86.7	0.304	24.965	-0.130
20	11.916	32.933	286.5	85.8	0.601	25.000	-0.152
30	11.649	32.944	287.1	86.9	0.894	25.059	-0.194
50	11.116	33.006	282.1	89.0	1.464	25.204	-0.245
75	10.339	33.129	251.9	90.5	2.132	25.435	-0.287
100	10.515	33.353	254.6	90.3	2.751	25.580	-0.077
125	9.178	33.454	202.4	90.2	3.318	25.881	-0.225
150	9.131	33.758	157.3	89.8	3.818	26.128	0.010
200	8.393	33.995	103.2	90.0	4.695	26.429	0.080
250	7.507	34.004	99.6	90.7	5.476	26.567	-0.045
300	6.743	33.988	97.5	90.9	6.202	26.660	-0.164
400	6.142	34.069	57.9	90.9	7.556	26.803	-0.180
500	5.193	34.106	47.5	91.0	8.778	26.949	-0.266
600	4.843	34.217	28.5	91.1	9.880	27.078	-0.219
700	4.627	34.320	22.9	91.1	10.869	27.185	-0.162
800	4.332	34.396	24.5	91.1	11.776	27.277	-0.135
900	4.085	34.432	27.4	91.1	12.619	27.332	-0.133
1000	3.736	34.451	29.9	91.2	13.416	27.384	-0.154
1014	3.721	34.454	30.5	91.2	13.523	27.388	-0.153

Station: 13 **Date:** 03/29/2012, 1019 **Lat.:** 35° 52.57 N **Long.:** 124° 01.36 W

P(dbar)	T(°C)	S	O_2(μm/kg)	Xmiss(%)	ΔΦ	σ_θ	π_θ
0	12.512	32.872	282.1	88.1	0.031	24.840	-0.083
10	12.442	32.866	281.7	87.9	0.310	24.849	-0.102
20	12.328	32.865	281.8	87.7	0.618	24.870	-0.126
30	12.201	32.850	280.6	88.5	0.925	24.883	-0.163
50	11.744	32.894	278.7	89.9	1.529	25.002	-0.217
75	11.104	33.001	274.1	90.8	2.239	25.203	-0.251
100	10.575	33.222	234.7	90.8	2.899	25.465	-0.168
125	9.531	33.307	222.2	90.8	3.495	25.710	-0.284
150	8.867	33.600	178.5	90.7	4.025	26.046	-0.158
200	8.141	33.924	125.2	90.8	4.919	26.411	-0.014
250	7.551	33.990	104.7	90.9	5.703	26.549	-0.050
300	6.843	34.012	92.5	90.9	6.435	26.666	-0.131
400	5.983	34.069	59.1	91.0	7.778	26.823	-0.200
500	5.158	34.100	50.5	91.0	8.993	26.948	-0.284
600	4.851	34.224	28.1	91.1	10.088	27.082	-0.213
700	4.635	34.326	22.9	91.1	11.074	27.188	-0.157
800	4.318	34.380	23.9	91.1	11.985	27.266	-0.149
900	4.147	34.425	26.8	91.1	12.838	27.321	-0.132
1000	3.852	34.455	30.5	91.2	13.646	27.376	-0.139
1013	3.816	34.459	31.1	91.2	13.747	27.382	-0.140

Station: 14 **Date:** 03/29/2012, 1227 **Lat.:** 35° 47.29 N **Long.:** 124° 11.88 W

P(dbar)	T(°C)	S	O_2(μm/kg)	Xmiss(%)	ΔΦ	σ_θ	π_θ
0	13.085	32.974	275.4	89.4	0.031	24.807	0.114
10	13.067	32.973	274.9	89.3	0.313	24.810	0.109
20	12.916	32.974	275.3	89.1	0.624	24.841	0.080
30	12.903	32.974	274.7	89.1	0.935	24.844	0.077
50	12.688	32.944	273.3	89.5	1.555	24.863	0.009
75	12.078	32.886	273.1	90.2	2.320	24.935	-0.159
100	10.500	33.072	254.6	90.8	3.031	25.364	-0.305
125	9.337	33.257	225.6	90.8	3.642	25.702	-0.356
150	9.112	33.703	173.4	90.8	4.173	26.087	-0.037
200	8.388	33.920	145.2	90.8	5.069	26.371	0.021
250	7.571	33.971	125.2	90.9	5.871	26.532	-0.061
300	7.164	34.050	86.3	90.9	6.612	26.651	-0.057
400	5.945	34.032	71.5	91.0	7.968	26.799	-0.233
500	5.285	34.131	45.1	91.0	9.190	26.958	-0.236
600	4.997	34.245	26.8	91.1	10.282	27.083	-0.180
700	4.676	34.324	23.3	91.1	11.278	27.182	-0.154
800	4.423	34.381	23.5	91.1	12.195	27.255	-0.137
900	4.133	34.425	26.6	91.1	13.054	27.322	-0.134
1000	3.859	34.449	29.6	91.2	13.863	27.370	-0.143
1014	3.810	34.454	30.2	91.2	13.973	27.379	-0.144

Station: 15 **Date:** 03/29/2012, 1509 **Lat.:** 35° 42.58 N **Long.:** 124° 22.72 W

P(dbar)	T(°C)	S	O_2(μm/kg)	Xmiss(%)	ΔΦ	σ_θ	π_θ
0	12.934	32.899	277.7	89.1	0.032	24.779	0.024
10	12.494	32.856	279.6	88.6	0.315	24.831	-0.100
20	12.253	32.825	282.2	88.1	0.624	24.854	-0.172
30	12.115	32.813	283.5	88.1	0.933	24.870	-0.209
50	11.829	32.815	281.6	89.5	1.543	24.925	-0.264
75	11.404	32.831	277.6	90.5	2.291	25.016	-0.332
100	11.014	33.026	265.1	90.7	3.003	25.238	-0.249
125	9.376	33.192	233.8	90.8	3.643	25.645	-0.401
150	9.222	33.593	187.4	90.8	4.189	25.984	-0.107
200	8.624	33.884	140.6	90.7	5.121	26.306	0.028
250	8.098	34.010	109.1	90.8	5.947	26.485	0.046
300	7.366	34.042	90.3	90.9	6.706	26.618	-0.035
400	6.202	34.078	61.3	91.0	8.077	26.803	-0.164
500	5.412	34.136	41.9	91.0	9.296	26.947	-0.217
600	5.179	34.239	28.1	91.1	10.412	27.057	-0.164
700	4.796	34.303	23.3	91.1	11.438	27.152	-0.158
800	4.490	34.377	23.4	91.1	12.378	27.245	-0.133
900	4.181	34.421	26.2	91.1	13.247	27.314	-0.132
1000	3.837	34.447	30.5	91.2	14.058	27.371	-0.147
1015	3.815	34.453	30.8	91.2	14.176	27.378	-0.144

Station: 16 **Date:** 03/29/2012, 1709 **Lat.:** 35° 37.61 N **Long.:** 124° 33.36 W

P(dbar)	T(°C)	S	O_2(μm/kg)	Xmiss(%)	ΔΦ	σ_θ	π_θ
0	12.436	32.822	283.6	87.8	0.031	24.816	-0.138
10	11.948	32.793	287.0	87.0	0.311	24.885	-0.258
20	11.855	32.796	287.0	87.0	0.615	24.905	-0.273
30	11.845	32.799	285.8	87.1	0.920	24.910	-0.273
50	11.767	32.813	283.6	88.9	1.527	24.935	-0.277
75	11.141	32.958	274.7	90.6	2.260	25.162	-0.279
100	10.668	33.056	264.0	90.7	2.942	25.323	-0.287
125	9.705	33.245	229.4	90.9	3.569	25.633	-0.304
150	9.024	33.479	201.2	90.8	4.127	25.926	-0.230
200	8.608	33.868	162.4	90.8	5.067	26.297	0.013
250	7.781	33.972	129.5	90.9	5.892	26.502	-0.030
300	6.999	33.999	105.9	90.9	6.643	26.634	-0.120
400	6.322	34.107	53.7	90.9	7.998	26.810	-0.126
500	5.552	34.144	41.7	91.0	9.230	26.936	-0.194
600	5.142	34.242	27.4	91.1	10.340	27.064	-0.165
700	4.692	34.300	23.3	91.1	11.353	27.161	-0.171
800	4.457	34.377	23.4	91.1	12.288	27.249	-0.137
900	4.170	34.419	26.1	91.1	13.155	27.313	-0.135
1000	3.930	34.446	29.0	91.1	13.973	27.361	-0.138
1013	3.878	34.449	29.9	91.2	14.076	27.368	-0.141

Station: 17 **Date:** 03/29/2012, 1944 **Lat.:** 35° 32.56 N **Long.:** 124° 43.75 W

P(dbar)	T(°C)	S	O_2(μm/kg)	Xmiss(%)	ΔΦ	σ_θ	π_θ
0	13.386	32.970	275.7	89.3	0.032	24.744	0.173
10	12.786	32.905	280.3	88.2	0.315	24.813	-0.002
20	12.359	32.858	284.0	87.4	0.626	24.859	-0.125
30	12.150	32.832	284.1	87.4	0.934	24.879	-0.187
50	11.907	32.812	282.7	88.4	1.546	24.908	-0.251
75	11.509	32.804	281.5	89.4	2.300	24.976	-0.334
100	10.963	32.989	270.2	90.6	3.019	25.218	-0.287
125	9.866	33.177	237.7	90.7	3.672	25.553	-0.331
150	8.976	33.379	214.3	90.7	4.248	25.855	-0.318
200	8.577	33.861	169.1	90.7	5.200	26.295	0.002
250	7.992	33.948	134.6	90.8	6.040	26.452	-0.018
300	7.321	33.962	132.9	90.9	6.821	26.561	-0.105
400	6.504	34.062	68.4	90.9	8.239	26.751	-0.138
500	5.565	34.129	44.0	91.0	9.497	26.923	-0.204
600	5.150	34.219	29.0	91.0	10.624	27.045	-0.183
700	4.829	34.311	23.3	91.1	11.652	27.155	-0.147
800	4.459	34.381	23.8	91.1	12.585	27.252	-0.134
900	4.130	34.422	26.6	91.1	13.449	27.320	-0.136
1000	3.845	34.460	31.0	91.1	14.255	27.380	-0.136
1016	3.805	34.466	31.8	91.1	14.379	27.389	-0.136

Station: 18 **Date:** 03/29/2012, 2147 **Lat.:** 35° 27.57 N **Long.:** 124° 54.42 W

P(dbar)	T(°C)	S	O_2(μm/kg)	Xmiss(%)	ΔΦ	σ_θ	π_θ
0	13.480	32.914	275.0	89.6	0.033	24.681	0.148
10	12.912	32.932	278.1	89.0	0.319	24.809	0.046
20	12.877	32.947	278.2	89.0	0.631	24.828	0.050
30	12.858	32.949	277.6	88.9	0.943	24.833	0.047
50	12.858	32.963	275.5	89.0	1.565	24.844	0.058
75	11.971	32.855	275.7	90.0	2.334	24.930	-0.205
100	11.237	32.935	274.4	90.6	3.069	25.128	-0.280
125	10.470	33.159	249.4	90.7	3.748	25.438	-0.240
150	9.124	33.370	212.4	90.7	4.335	25.825	-0.301
200	8.555	33.872	173.0	90.7	5.298	26.307	0.007
205	8.513	33.884	176.6	90.7	5.384	26.323	0.011

Station: 19 **Date:** 03/29/2012, 2302 **Lat.:** 35° 27.53 N **Long.:** 124° 54.54 W

P(dbar)	T(°C)	S	O_2(μm/kg)	Xmiss(%)	ΔΦ	σ_θ	π_θ
0	13.467	32.907	277.8	89.3	0.033	24.679	0.140
10	12.868	32.938	278.5	88.8	0.318	24.822	0.042
20	12.842	32.940	277.7	88.8	0.630	24.829	0.037
30	12.832	32.944	277.2	88.8	0.941	24.834	0.038
50	12.650	32.946	275.8	89.4	1.562	24.871	0.002
75	11.709	32.826	278.0	90.0	2.327	24.957	-0.278
100	11.260	32.946	273.4	90.5	3.061	25.132	-0.268
125	10.566	33.135	251.4	90.6	3.742	25.402	-0.243
150	9.234	33.431	208.8	90.6	4.332	25.855	-0.234
200	8.562	33.868	175.4	90.7	5.293	26.303	0.006
250	7.955	33.944	131.6	90.7	6.131	26.454	-0.027
300	7.171	33.957	123.1	90.8	6.905	26.578	-0.130
400	5.991	34.008	80.6	90.8	8.305	26.774	-0.247
500	5.391	34.102	49.6	90.9	9.553	26.923	-0.246
600	4.795	34.192	31.7	91.0	10.669	27.063	-0.244
700	4.517	34.278	23.9	91.0	11.676	27.163	-0.208
800	4.293	34.337	22.5	91.0	12.613	27.234	-0.186
900	4.144	34.420	26.3	91.0	13.484	27.317	-0.136
1000	3.883	34.459	30.8	91.1	14.292	27.375	-0.133
1100	3.626	34.485	35.4	91.1	15.056	27.422	-0.138
1200	3.367	34.508	39.7	91.1	15.779	27.466	-0.146
1300	3.166	34.524	43.1	91.1	16.467	27.498	-0.152
1400	2.950	34.539	46.7	91.1	17.124	27.531	-0.160
1500	2.765	34.555	50.9	91.1	17.754	27.560	-0.164
1750	2.333	34.589	---	91.2	19.220	27.625	-0.175
2000	2.064	34.612	---	91.2	20.556	27.666	-0.179
2500	1.753	34.644	---	91.3	23.007	27.719	-0.179
3000	1.603	34.663	---	91.3	25.317	27.748	-0.178
3500	1.511	34.678	---	91.3	27.569	27.770	-0.176
3994	1.491	34.685	---	91.3	29.773	27.781	-0.175

Table A3: *Results of nutrient and primary productivity analyses at hydrographic stations where those water samples were collected during the PaCOOS cruise of March 2012.* Stations are in chronological (and numerical) order. The time listed (*<Mon. dd, yyyy hh:mm> UT*) for each station is the beginning of the CTD cast. 12 Niskin bottles were tripped at each station. The data for each station are separated into up to three sections ("Physical and Chemical," "Biological," and "Integrated Values").

The physical oceanographic properties listed in the first seven and the last columns of the "Physical and Chemical" section of each station's data are the uncorrected values measured by the CTD at the times each Niskin bottle was tripped. Because they are uncorrected, these values may differ slightly from those listed in Table A2. Columns eight through twelve of this section give the nitrate (NO_3), nitrite (NO_2), ammonium (NH_4), phosphate (PO_4), and dissolved silicate (SiO_4) concentrations.

When included, the "Biological" section of each station's data gives the results of the nutrient and primary productivity analyses, while the "Integrated Values" section sums the nutrient and primary productivity results over the water column to the depth at which light intensity reaches 1% of its surface value.

Date GMT:	Mar 27, 2012 16:42	**Cruise:**	S112	**Latitude:**	36.794	**Year:**	2012
Project:	PACOOS	**Station:**	C1	**Longitude:**	-121.842	**Work week:**	13
Platform:	POINT SUR	**Cast:**	1	**Secchi Depth:**	9	**Day of Year:**	87

** Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.*

Physical and Chemical

DEP (m)	PRESS (db)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANS (%)	NO3 (µM)	NO2 (µM)	NH4 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l^{-1})
0	1.1	12	10.767	33.517	25.662	80	13.69	0.21	0.55	1.16	16.19	5.79
5	5.8	11	10.766	33.518	25.663	80	---	---	0.81	---	---	5.77
10	10.5	10	10.754	33.518	25.666	80	---	---	1.01	---	---	5.77
20	20.2	9	10.681	33.532	25.689	79	14.25	0.23	0.62	1.45	16.57	5.60
30	30.1	8	10.644	33.540	25.702	78	15.01	0.23	0.76	1.52	17.32	5.54
40	39.5	7	10.345	33.613	25.811	78	16.85	0.26	1.07	1.70	20.14	5.06
60	60.3	6	10.069	33.680	25.911	75	18.54	0.27	1.29	1.82	22.83	4.58
80	80.2	5	9.856	33.720	25.979	78	---	---	---	---	---	4.26
100	101.6	4	9.637	33.761	26.047	79	21.25	0.29	1.41	1.97	26.63	3.87
150	151.6	3	9.167	33.850	26.194	75	25.15	0.29	1.23	2.19	32.68	3.11
200	225.9	1	7.868	34.056	26.555	73	32.34	0.25	0.39	2.83	50.21	1.56
200	202.3	2	8.237	34.001	26.457	69	30.25	0.26	0.62	2.67	45.19	1.89

Biological

DEP (m)	BTL #	CHL (mg m^{-3})	PHAEO (mg m^{-3})	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m^{-3})	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	1.590	0.614	0	100	74.207	46.662	0
5	11	1.085	0.519	5	50	33.200	30.587	4
10	10	0.942	0.519	5	30	30.970	28.533	8
20	9	0.724	0.552	10	15	23.261	24.683	13
30	8	0.555	0.534	20	5	16.168	22.344	21
40	7	0.724	0.645	20	1	3.750	5.182	33
60	6	0.614	0.577	40	0.1	0.182	0.251	50
100	4	0.379	0.500					
150	3	0.597	0.627					
200	2	0.345	0.914					

Integrated Values *Integrated to 1.0% of Surface Intensity (S.I.)*

Chlorophyll *a:*	30.10	mg m^{-2}	Carbon Fixation:	757.23	mg m^{-2}
Phaeophytin:	17.88	mg m^{-2}	Productivity Index:	25.16	

** Abbreviations:* ***DEP*** *Depth,* ***PRESS*** *Pressure,* ***BTL*** *Bottle,* ***TEMP*** *Temperature,* ***SAL*** *Salinity,* ***TRANSMISS*** *Transmissivity,* ***S.I.*** *Surface Intensity,* ***CHL*** *Chlorophyll a,* ***PHAEO*** *Phaeophytin,* ***PROD INDEX*** *Productivity Index,* ***O2*** *Oxygen,* **µM** micromole/kg

Date GMT:	Mar 27, 2012 19:29	**Cruise:**	S112	**Latitude:**	36.735	**Year:**	2012
Project:	PACOOS	**Station:**	H3	**Longitude:**	-122.021	**Work week:**	13
Platform:	POINT SUR	**Cast:**	2	**Secchi Depth:**	1	**Day of Year:**	87

** Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.*

Physical and Chemical

DEP (m)	PRESS (db)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANS (%)	NO3 (µM)	NO2 (µM)	NH4 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l^{-1})
0	2.0	12	10.971	33.446	25.571	74	12.90	0.71	0.69	---	14.80	5.90
5	4.7	11	10.957	33.450	25.577	74	12.39	0.31	0.76	---	14.27	5.90
10	10.5	10	10.926	33.461	25.591	75	12.14	0.25	0.78	1.41	14.20	5.89
20	20.9	9	10.579	33.494	25.677	77	14.03	0.25	0.91	1.37	16.05	5.55
30	30.1	8	10.459	33.540	25.735	76	14.70	0.28	1.06	1.46	16.88	5.37
40	40.5	7	10.192	33.604	25.830	77	16.05	0.28	1.09	1.48	18.63	4.94
60	58.0	6	9.400	33.734	26.064	79	---	---	---	---	---	3.62
80	82.6	5	8.902	33.805	26.199	83	25.47	0.07	0.05	1.97	28.81	3.00
100	101.4	4	8.675	33.918	26.323	81	27.92	0.03	0.05	2.16	33.46	2.58
125	127.9	3	8.589	33.979	26.385	79	29.19	0.12	0.05	2.29	38.40	2.17
150	151.7	2	8.547	33.997	26.406	80	30.12	0.16	0.05	2.45	40.92	2.03
1000	1012.4	1	4.021	34.437	27.344	77	42.38	0.02	0.05	3.35	124.30	0.47

Biological

DEP (m)	BTL #	CHL (mg m^{-3})	PHAEO (mg m^{-3})	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m^{-3})	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	1.228	0.706	0	100	86.195	70.163	0
5	11	1.262	0.588	0	50	76.747	62.472	4
10	10	1.195	0.689	0	30	71.714	58.376	8
20	9	0.749	0.594	0	15	55.018	44.785	12
30	8	0.623	0.492	0	5	16.432	13.376	19
40	7	0.505	0.475	5	1	3.271	2.592	32
80	5	0.039	0.194	5	0.1	0.507	0.402	53
100	4	0.030	0.140					
1000	1	0.019	0.166					

Integrated Values *Integrated to 1.0% of Surface Intensity (S.I.)*

Chlorophyll *a:*	39.18	mg m^{-2}	Carbon Fixation:	1265.6	mg m^{-2}
Phaeophytin:	21.68	mg m^{-2}	Productivity Index:	32.30	

** Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll a, **PHAEO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen,* **µM** micromole/kg

Date GMT:	Mar 28, 2012 09:31	**Cruise:**	S112	**Latitude:**	36.722	**Year:**	2012
Project:	PACOOS	**Station:**	NPS1	**Longitude:**	-122.240	**Work week:**	13
Platform:	POINT SUR	**Cast:**	3	**Secchi Depth:**	---	**Day of Year:**	88

** Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.*

P h y s i c a l a n d C h e m i c a l

DEP (m)	PRESS (db)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANS (%)	NO3 (µM)	NO2 (µM)	NH4 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l^{-1})
0	2.1	12	11.433	33.181	25.281	88	6.62	0.13	---	0.74	9.19	6.06
50	51.4	11	10.936	33.357	25.509	88	---	---	---	---	---	5.90
100	99.4	10	9.172	33.767	26.127	92	24.89	0.15	---	1.78	27.22	3.27
200	203.5	9	8.330	34.055	26.486	93	31.13	0.00	---	2.42	41.12	1.78
300	303.1	8	7.605	34.164	26.679	94	34.51	0.00	---	2.84	53.27	1.03
400	404.9	7	6.761	34.183	26.812	95	36.98	0.00	---	3.02	66.39	0.74
500	506.3	6	6.157	34.226	26.927	95	38.55	0.00	---	3.22	74.44	0.48
600	606.8	5	5.599	34.277	27.037	93	40.53	0.00	---	3.35	85.16	0.30
700	708.9	4	5.132	34.328	27.134	93	41.60	0.00	---	3.38	94.86	0.23
800	810.6	3	4.667	34.375	27.225	92	42.42	0.00	---	3.47	104.81	0.26
900	911.7	2	4.348	34.411	27.288	90	42.81	0.00	---	3.52	110.84	0.28
1000	1011.3	1	4.137	34.431	27.328	84	42.78	0.00	---	3.46	117.92	0.36

** Abbreviations:* ***DEP*** *Depth,* ***PRESS*** *Pressure,* ***BTL*** *Bottle,* ***TEMP*** *Temperature,* ***SAL*** *Salinity,* ***TRANSMISS*** *Transmissivity,* ***S.I.*** *Surface Intensity,* ***CHL*** *Chlorophyll a,* ***PHAEO*** *Phaeophytin,* ***PROD INDEX*** *Productivity Index,* ***O2*** *Oxygen,* **µM** micromole/kg

Date GMT:	Mar 28, 2012 12:08	**Cruise:**	S112	**Latitude:**	36.623	**Year:**	2012
Project:	PACOOS	**Station:**	67-55	**Longitude:**	-122.419	**Work week:**	13
Platform:	POINT SUR	**Cast:**	4	**Secchi Depth:**	11	**Day of Year:**	88

** Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.*

Physical and Chemical

DEP (m)	PRESS (db)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANS (%)	NO3 (µM)	NO2 (µM)	NH4 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l^{-1})
0	1.5	12	12.232	33.002	24.994	91	1.65	0.03	0.08	0.40	4.59	6.00
5	5.7	11	12.232	33.002	24.994	91	---	---	---	---	---	5.99
10	9.8	10	12.225	33.003	24.996	91	1.66	0.03	0.08	0.47	4.42	6.01
20	20.6	9	12.170	33.000	25.005	90	1.91	0.04	0.08	0.53	4.54	6.01
30	30.6	8	11.987	33.054	25.081	90	3.76	0.07	0.10	0.57	6.11	6.04
40	41.9	7	10.696	33.413	25.594	89	11.65	0.19	0.54	1.08	12.97	5.74
60	61.2	6	9.944	33.510	25.799	91	17.14	0.30	0.44	1.41	16.71	4.77
80	80.3	5	9.400	33.652	26.000	92	22.36	0.24	0.16	1.75	22.31	3.71
100	104.0	4	9.189	33.775	26.131	92	25.78	0.05	0.05	1.96	27.50	3.19
150	151.8	3	8.421	33.996	26.424	94	29.86	0.00	0.04	2.24	36.21	2.21
200	205.4	2	7.975	34.077	26.555	96	32.32	0.00	0.05	2.53	43.62	1.64
1000	1011.8	1	4.031	34.447	27.351	97	43.32	0.00	0.05	3.45	117.34	0.36

Biological

DEP (m)	BTL #	CHL (mg m^{-3})	PHAEO (mg m^{-3})	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m^{-3})	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	0.461	0.250	0	100	19.180	41.595	0
10	10	0.454	0.230	0	50	25.206	54.664	7
20	9	0.521	0.223	10	30	23.842	52.472	12
30	8	0.749	0.324	10	15	19.735	43.435	18
40	7	1.010	0.739	20	5	9.154	17.575	28
60	6	1.069	0.638	30	1	3.823	5.105	40
80	5	0.394	0.385	40	0.1	0.622	0.616	55
100	4	0.175	0.246					
150	3	0.011	0.157					
200	2	0.017	0.098					
1000	1	0.005	0.052					

Integrated Values *Integrated to 1.0% of Surface Intensity (S.I.)*

Chlorophyll *a:*	20.56	mg m^{-2}	Carbon Fixation:	628.91	mg m^{-2}
Phaeophytin:	9.80	mg m^{-2}	Productivity Index:	30.60	

** Abbreviations:* ***DEP*** *Depth,* ***PRESS*** *Pressure,* ***BTL*** *Bottle,* ***TEMP*** *Temperature,* ***SAL*** *Salinity,* ***TRANSMISS*** *Transmissivity,* ***S.I.*** *Surface Intensity,* ***CHL*** *Chlorophyll a,* ***PHAEO*** *Phaeophytin,* ***PROD INDEX*** *Productivity Index,* ***O2*** *Oxygen,* **µM** micromole/kg

Date GMT:	Mar 28, 2012 15:06	**Cruise:**	S112	**Latitude:**	36.539	**Year:**	2012
Project:	PACOOS	**Station:**	NPS2	**Longitude:**	-122.600	**Work week:**	13
Platform:	POINT SUR	**Cast:**	5	**Secchi Depth:**	13	**Day of Year:**	88

** Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.*

P h y s i c a l a n d C h e m i c a l

DEP (m)	PRESS (db)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANS (%)	NO3 (µM)	NO2 (µM)	NH4 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l^{-1})
0	1.5	12	11.946	33.019	25.061	91	2.52	0.07	---	0.51	5.60	6.04
50	49.7	11	10.433	33.087	25.386	93	---	---	---	---	---	5.41
100	101.7	10	9.481	33.654	25.989	96	23.24	0.25	---	1.84	22.86	3.85
200	201.1	9	8.254	34.004	26.457	99	30.43	0.02	---	2.25	37.76	2.07
300	305.6	8	7.100	34.066	26.673	101	34.81	0.01	---	2.63	51.62	1.45
400	406.9	7	6.429	34.183	26.856	101	38.30	0.00	---	3.02	67.16	0.63
500	506.1	6	5.923	34.241	26.968	101	---	---	---	---	---	0.39
600	608.2	5	5.401	34.298	27.078	101	39.06	0.00	---	3.19	84.89	0.26
700	705.9	4	4.903	34.345	27.174	101	42.28	0.00	---	3.41	98.90	0.21
800	816.0	3	4.499	34.394	27.258	100	---	---	---	---	---	0.25
900	908.3	2	4.211	34.429	27.317	100	43.16	0.00	---	3.38	112.33	0.31
1000	1013.3	1	3.893	34.460	27.375	100	43.36	0.00	---	3.42	119.21	0.41

** Abbreviations:* ***DEP*** *Depth,* ***PRESS*** *Pressure,* ***BTL*** *Bottle,* ***TEMP*** *Temperature,* ***SAL*** *Salinity,* ***TRANSMISS*** *Transmissivity,* ***S.I.*** *Surface Intensity,* ***CHL*** *Chlorophyll a,* ***PHAEO*** *Phaeophytin,* ***PROD INDEX*** *Productivity Index,* ***O2*** *Oxygen,* **µM** micromole/kg

Date GMT:	Mar 28, 2012 17:13	**Cruise:**	S112	**Latitude:**	36.461	**Year:**	2012
Project:	PACOOS	**Station:**	67-60	**Longitude:**	-122.778	**Work week:**	13
Platform:	POINT SUR	**Cast:**	6	**Secchi Depth:**	---	**Day of Year:**	88

** Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.*

Physical and Chemical

DEP (m)	PRESS (db)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANS (%)	NO3 (µM)	NO2 (µM)	NH4 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l^{-1})
0	1.7	12	11.554	32.944	25.075	90	3.21	0.07	0.08	0.56	6.61	6.18
5	4.6	11	11.538	32.947	25.081	91	---	---	---	---	---	6.19
10	10.5	10	11.525	32.952	25.087	92	3.07	0.08	0.09	0.63	6.46	6.17
20	20.1	9	11.646	33.014	25.113	93	3.53	0.12	0.09	0.73	6.79	6.13
30	30.3	8	11.629	33.150	25.222	94	5.35	0.19	0.11	0.76	7.61	6.09
40	41.4	7	11.295	33.248	25.360	97	7.16	0.47	0.07	0.88	7.87	5.81
60	60.7	6	10.974	33.315	25.469	99	9.69	0.52	0.06	1.01	10.00	5.64
80	80.0	5	10.332	33.414	25.659	99	14.60	0.35	0.38	1.35	14.79	5.30
100	102.5	4	9.813	33.514	25.825	99	18.40	0.44	0.18	1.51	18.87	5.00
150	153.2	3	8.784	33.894	26.289	99	27.54	0.05	0.04	2.01	30.56	2.69
200	202.7	2	7.888	33.948	26.467	100	30.25	0.02	0.04	2.26	37.21	2.38
1000	1012.9	1	3.828	34.466	27.387	98	43.75	0.00	0.03	3.35	120.38	0.43

Biological

DEP (m)	BTL #	CHL (mg m^{-3})	PHAEO (mg m^{-3})	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m^{-3})	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	0.968	0.266	0	100	48.605	50.231	0
10	10	0.900	0.375	10	50	52.087	57.853	5
20	9	0.841	0.307	10	30	48.435	53.797	9
30	8	0.732	0.408	10	15	37.598	41.761	14
40	7	0.480	0.289	20	5	15.556	18.488	23
60	6	0.252	0.205	40	1	2.482	5.175	36
80	5	0.136	0.160	60	0.1	0.200	0.792	58
100	4	0.093	0.146					
150	3	0.060	0.165					
200	2	0.021	0.066					
1000	1	0.006	0.059					

Integrated Values *Integrated to 1.0% of Surface Intensity (S.I.)*

Chlorophyll *a:*	28.96	mg m^{-2}	Carbon Fixation:	1021.7	mg m^{-2}
Phaeophytin:	11.82	mg m^{-2}	Productivity Index:	35.29	

** Abbreviations:* ***DEP*** *Depth,* ***PRESS*** *Pressure,* ***BTL*** *Bottle,* ***TEMP*** *Temperature,* ***SAL*** *Salinity,* ***TRANSMISS*** *Transmissivity,* ***S.I.*** *Surface Intensity,* ***CHL*** *Chlorophyll a,* ***PHAEO*** *Phaeophytin,* ***PROD INDEX*** *Productivity Index,* ***O2*** *Oxygen,* **µM** micromole/kg

Date GMT:	Mar 28, 2012 19:55	**Cruise:**	S112	**Latitude:**	36.377	**Year:**	2012
Project:	PACOOS	**Station:**	NPS3	**Longitude:**	-122.955	**Work week:**	13
Platform:	POINT SUR	**Cast:**	7	**Secchi Depth:**	---	**Day of Year:**	88

** Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.*

P h y s i c a l a n d C h e m i c a l

DEP (m)	PRESS (db)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANS (%)	NO3 (µM)	NO2 (µM)	NH4 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l^{-1})
5	3.6	12	10.991	33.072	25.276	91	7.36	0.16	---	0.76	10.01	6.13
50	49.9	11	9.928	33.290	25.630	99	---	---	---	---	---	4.42
100	102.9	10	9.128	33.789	26.151	99	27.02	0.07	---	2.01	28.76	3.18
200	202.4	9	7.375	33.953	26.544	101	30.65	0.00	---	2.15	41.31	2.57
300	302.9	8	6.640	34.039	26.714	101	36.12	0.00	---	2.64	56.29	1.45
400	404.6	7	5.779	34.105	26.877	101	39.50	0.00	---	2.99	72.53	0.82
500	504.1	6	5.354	34.183	26.991	101	40.85	0.00	---	3.12	83.29	0.47
600	607.2	5	4.764	34.258	27.119	101	42.48	0.00	---	3.29	97.17	0.25
700	704.7	4	4.673	34.375	27.223	100	42.81	0.00	---	3.37	102.25	0.22
800	810.4	3	4.359	34.416	27.291	99	42.99	0.00	---	3.29	109.60	0.28
900	912.4	2	4.091	34.440	27.339	98	43.31	0.00	---	3.32	114.93	0.34
1000	1010.7	1	3.840	34.464	27.384	97	43.34	0.00	---	3.33	120.35	0.43

** Abbreviations:* ***DEP*** *Depth,* ***PRESS*** *Pressure,* ***BTL*** *Bottle,* ***TEMP*** *Temperature,* ***SAL*** *Salinity,* ***TRANSMISS*** *Transmissivity,* ***S.I.*** *Surface Intensity,* ***CHL*** *Chlorophyll a,* ***PHAEO*** *Phaeophytin,* ***PROD INDEX*** *Productivity Index,* ***O2*** *Oxygen,* **µM** micromole/kg

Date GMT:	Mar 28, 2012 22:06	**Cruise:**	S112	**Latitude:**	36.292	**Year:**	2012
Project:	PACOOS	**Station:**	67-65	**Longitude:**	-123.133	**Work week:**	13
Platform:	POINT SUR	**Cast:**	8	**Secchi Depth:**	14	**Day of Year:**	88

** Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.*

Physical and Chemical

DEP (m)	PRESS (db)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANS (%)	NO3 (µM)	NO2 (µM)	NH4 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l^{-1})
0	2.0	12	11.846	33.257	25.265	91	7.60	0.13	0.07	0.73	10.15	6.23
5	3.8	11	11.466	33.246	25.326	92	7.50	0.13	0.07	0.84	10.37	6.23
10	10.0	10	11.330	33.246	25.351	92	7.50	0.16	0.08	0.84	10.44	6.25
20	20.0	9	11.282	33.246	25.360	92	7.42	0.15	0.08	0.91	10.19	6.27
30	29.6	8	11.103	33.334	25.461	93	9.76	0.22	0.18	1.00	10.55	6.19
40	40.6	7	10.390	33.500	25.716	97	14.06	0.32	0.93	1.28	12.02	5.77
60	60.7	6	9.515	33.706	26.024	99	23.26	0.34	0.67	1.93	23.68	4.19
80	80.5	5	9.098	33.814	26.175	98	26.80	0.07	0.04	2.11	29.27	2.90
100	100.9	4	8.849	33.882	26.268	98	28.13	0.01	0.04	2.08	32.04	2.44
150	153.4	3	8.378	33.995	26.430	98	30.09	0.06	0.07	2.25	36.77	2.01
200	203.2	2	7.581	34.009	26.560	100	31.52	0.01	0.02	2.31	42.01	2.05
1000	1011.9	1	3.791	34.461	27.387	98	43.84	0.00	0.03	3.38	120.29	0.43

Biological

DEP (m)	BTL #	CHL (mg m^{-3})	PHAEO (mg m^{-3})	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m^{-3})	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	1.035	0.266	0	100	56.631	54.718	0
5	11	0.993	0.342	5	50	67.890	68.376	5
10	10	1.388	0.445	10	30	44.087	31.755	9
20	9	1.683	0.539	20	15	62.517	37.149	13
30	8	1.414	0.698	20	5	26.704	15.868	20
40	7	0.597	0.332	40	1	2.802	4.691	29
60	6	0.164	0.212	60	0.1	0.319	1.944	47
80	5	0.093	0.293					
100	4	0.098	0.307					
150	3	0.053	0.299					
200	2	0.013	0.099					
1000	1	0.002	0.027					

Integrated Values *Integrated to 1.0% of Surface Intensity (S.I.)*

Chlorophyll *a:*	38.20	mg m^{-2}	Carbon Fixation:	1184.4	mg m^{-2}
Phaeophytin:	12.84	mg m^{-2}	Productivity Index:	31.00	

** Abbreviations:* ***DEP*** *Depth,* ***PRESS*** *Pressure,* ***BTL*** *Bottle,* ***TEMP*** *Temperature,* ***SAL*** *Salinity,* ***TRANSMISS*** *Transmissivity,* ***S.I.*** *Surface Intensity,* ***CHL*** *Chlorophyll a,* ***PHAEO*** *Phaeophytin,* ***PROD INDEX*** *Productivity Index,* ***O2*** *Oxygen,* **µM** micromole/kg

Date GMT:	Mar 29, 2012 00:52	**Cruise:**	S112	**Latitude:**	36.209	**Year:**	2012
Project:	PACOOS	**Station:**	NPS4	**Longitude:**	-123.310	**Work week:**	13
Platform:	POINT SUR	**Cast:**	9	**Secchi Depth:**	---	**Day of Year:**	89

** Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.*

P h y s i c a l a n d C h e m i c a l

DEP (m)	PRESS (db)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANS (%)	NO3 (µM)	NO2 (µM)	NH4 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l^{-1})
0	1.9	12	12.118	33.169	25.145	90	5.14	0.08	---	0.64	8.63	6.23
50	50.1	11	10.214	33.400	25.667	98	14.80	0.22	---	1.31	15.02	5.28
100	99.8	10	8.369	33.748	26.237	99	23.95	0.00	---	1.71	26.72	3.72
200	202.9	9	7.411	33.986	26.565	101	31.41	0.00	---	2.25	42.66	2.31
300	306.3	8	6.510	34.050	26.740	101	36.94	0.00	---	2.68	59.07	1.34
400	401.5	7	5.879	34.109	26.868	101	39.53	0.00	---	2.96	71.56	0.78
500	505.0	6	5.284	34.154	26.976	101	41.25	0.00	---	3.15	83.01	0.56
600	607.6	5	4.900	34.254	27.100	101	42.11	0.00	---	3.23	93.85	0.27
700	706.3	4	4.642	34.347	27.204	100	42.97	0.00	---	3.32	103.25	0.20
800	812.5	3	4.316	34.406	27.287	99	43.36	0.00	---	3.35	110.12	0.25
900	910.8	2	4.059	34.437	27.339	99	43.43	0.00	---	3.34	115.82	0.33
1000	1011.9	1	3.777	34.459	27.386	98	43.80	0.00	---	3.38	122.29	0.40

** Abbreviations:* ***DEP*** *Depth,* ***PRESS*** *Pressure,* ***BTL*** *Bottle,* ***TEMP*** *Temperature,* ***SAL*** *Salinity,* ***TRANSMISS*** *Transmissivity,* ***S.I.*** *Surface Intensity,* ***CHL*** *Chlorophyll a,* ***PHAEO*** *Phaeophytin,* ***PROD INDEX*** *Productivity Index,* ***O2*** *Oxygen,* **µM** micromole/kg

Date GMT:	Mar 29, 2012 03:00	**Cruise:**	S112	**Latitude:**	36.125	**Year:**	2012
Project:	PACOOS	**Station:**	67-70	**Longitude:**	-123.491	**Work week:**	13
Platform:	POINT SUR	**Cast:**	10	**Secchi Depth:**	14	**Day of Year:**	89

** Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.*

Physical and Chemical

DEP (m)	PRESS (db)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANS (%)	NO3 (µM)	NO2 (µM)	NH4 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l^{-1})
0	2.0	12	11.762	33.080	25.142	91	6.00	0.09	0.15	0.47	9.25	6.13
5	4.8	11	11.175	33.076	25.246	90	6.16	0.10	0.14	0.72	9.60	6.23
10	9.6	10	11.073	33.080	25.268	89	6.21	0.11	0.12	0.74	9.50	6.24
20	21.9	9	11.005	33.160	25.343	92	7.19	0.14	0.08	0.87	9.74	6.11
30	30.0	8	10.868	33.279	25.459	93	10.06	0.20	0.11	0.97	11.41	5.99
40	40.8	7	10.623	33.345	25.554	95	11.56	0.22	0.20	1.09	11.29	5.75
60	58.8	6	9.764	33.410	25.751	98	18.11	0.05	0.05	1.42	17.09	4.45
80	79.0	5	9.116	33.503	25.929	100	21.19	0.01	0.05	1.63	20.93	3.88
100	101.0	4	8.622	33.684	26.148	99	23.61	0.01	0.05	1.73	25.19	3.65
150	153.3	3	8.205	33.915	26.394	100	28.74	0.00	0.05	2.05	33.85	2.66
200	203.3	2	7.806	34.018	26.534	100	31.64	0.02	0.07	2.30	41.64	1.99
1000	1013.8	1	3.707	34.469	27.401	97	44.07	0.00	0.04	3.34	122.87	0.45

Biological

DEP (m)	BTL #	CHL (mg m^{-3})	PHAEO (mg m^{-3})	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m^{-3})	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	0.707	0.239	0	100	56.732	80.266	0
5	11	0.926	0.316	5	50	80.305	86.762	5
10	10	1.136	0.469	10	30	78.595	69.190	9
20	9	1.346	0.461	20	15	51.506	38.258	14
30	8	1.144	0.511	20	5	25.915	19.249	21
40	7	0.732	0.383	40	1	4.069	5.558	32
60	6	0.241	0.180	60	0.1	0.225	0.937	50
80	5	0.045	0.123					
100	4	0.019	0.119					
150	3	0.013	0.090					
200	2	0.027	0.190					
1000	1	0.002	0.027					

Integrated Values *Integrated to 1.0% of Surface Intensity (S.I.)*

Chlorophyll *a:*	34.73	mg m^{-2}	Carbon Fixation:	1402.4	mg m^{-2}
Phaeophytin:	12.92	mg m^{-2}	Productivity Index:	40.38	

** Abbreviations:* ***DEP*** *Depth,* ***PRESS*** *Pressure,* ***BTL*** *Bottle,* ***TEMP*** *Temperature,* ***SAL*** *Salinity,* ***TRANSMISS*** *Transmissivity,* ***S.I.*** *Surface Intensity,* ***CHL*** *Chlorophyll a,* ***PHAEO*** *Phaeophytin,* ***PROD INDEX*** *Productivity Index,* ***O2*** *Oxygen,* **µM** micromole/kg

Date GMT:	Mar 29, 2012 05:35	**Cruise:**	S112	**Latitude:**	36.041	**Year:**	2012
Project:	PACOOS	**Station:**	NPS5	**Longitude:**	-123.67	**Work week:**	13
Platform:	POINT SUR	**Cast:**	11	**Secchi Depth:**	---	**Day of Year:**	89

** Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.*

P h y s i c a l a n d C h e m i c a l

DEP (m)	PRESS (db)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANS (%)	NO3 (µM)	NO2 (µM)	NH4 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l^{-1})
0	1.5	12	11.909	32.956	25.019	81	1.88	0.03	---	0.37	5.04	6.20
50	51.2	11	10.839	33.396	25.556	85	11.37	0.19	---	1.03	11.15	5.96
100	102.5	10	9.407	33.638	25.988	87	22.51	0.27	---	1.80	22.92	4.21
200	202.1	9	7.768	33.955	26.490	87	30.04	0.01	---	2.24	38.56	2.54
300	303.5	8	6.974	34.073	26.696	87	35.30	0.00	---	2.63	54.15	1.30
400	405.5	7	6.060	34.098	26.837	87	39.13	0.00	---	2.90	68.86	0.86
500	505.9	6	5.222	34.150	26.981	87	41.35	0.00	---	3.05	83.68	0.56
600	606.3	5	4.830	34.261	27.114	87	42.74	0.00	---	3.25	96.60	0.25
700	711.2	4	4.496	34.334	27.210	87	43.14	0.00	---	3.33	104.36	0.19
900	915.2	2	4.028	34.434	27.340	85	43.36	0.00	---	3.29	115.79	0.32
900	916.1	3	4.028	34.434	27.340	85	43.57	0.00	---	3.31	115.68	0.32
1000	1009.1	1	3.780	34.464	27.390	85	43.73	0.00	---	3.32	121.11	0.43

** Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll a, **PHAEO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen,* **µM** micromole/kg

Date GMT:	Mar 29, 2012 07:33	**Cruise:**	S112	**Latitude:**	35.958	**Year:**	2012
Project:	PACOOS	**Station:**	67-75	**Longitude:**	-123.844	**Work week:**	13
Platform:	POINT SUR	**Cast:**	12	**Secchi Depth:**	14	**Day of Year:**	89

** Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.*

Physical and Chemical

DEP (m)	PRESS (db)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANS (%)	NO3 (µM)	NO2 (µM)	NH4 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l^{-1})
0	1.0	12	12.597	32.923	24.863	84	0.91	0.01	0.08	0.31	3.83	6.05
5	5.9	11	12.208	32.932	24.944	84	---	---	---	---	---	6.11
10	9.9	10	12.112	32.927	24.959	83	0.89	0.02	0.08	0.41	3.69	6.12
20	20.6	9	11.908	32.936	25.004	83	1.28	0.02	0.08	0.41	3.97	6.14
30	28.8	8	11.683	32.943	25.051	84	2.22	0.05	0.10	0.47	4.66	6.19
40	40.1	7	11.454	32.985	25.126	85	3.72	0.09	0.14	0.56	5.80	6.10
60	58.4	6	10.872	33.092	25.314	86	7.13	0.15	0.13	0.76	8.14	5.76
80	78.8	5	10.587	33.278	25.509	87	11.62	0.27	0.28	1.02	12.09	5.76
100	103.7	4	10.143	33.436	25.709	87	17.14	0.42	0.08	1.36	17.31	5.16
150	154.7	3	9.044	33.808	26.180	87	26.73	0.01	0.04	2.10	28.53	2.94
200	200.7	2	8.398	33.998	26.431	87	30.34	0.01	0.05	2.22	36.27	2.02
1000	1011.0	1	3.724	34.455	27.388	88	44.36	0.00	0.05	3.37	121.42	0.39

Biological

DEP (m)	BTL #	CHL (mg m^{-3})	PHAEO (mg m^{-3})	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m^{-3})	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	0.506	0.135	0	100	30.311	59.938	0
10	10	0.648	0.205	10	50	27.726	42.794	6
20	9	0.858	0.274	10	30	30.144	46.526	11
30	8	0.799	0.316	20	15	27.131	31.611	17
40	7	0.639	0.273	20	5	13.511	15.742	26
60	6	0.310	0.233	40	1	3.286	5.139	39
80	5	0.189	0.225	60	0.1	0.257	0.831	60
100	4	0.091	0.202					
150	3	0.071	0.235					
200	2	0.061	0.274					
1000	1	0.003	0.016					

Integrated Values *Integrated to 1.0% of Surface Intensity (S.I.)*

Chlorophyll *a:*	28.39	mg m^{-2}	Carbon Fixation:	775.32	mg m^{-2}
Phaeophytin:	9.40	mg m^{-2}	Productivity Index:	27.31	

** Abbreviations:* ***DEP*** *Depth,* ***PRESS*** *Pressure,* ***BTL*** *Bottle,* ***TEMP*** *Temperature,* ***SAL*** *Salinity,* ***TRANSMISS*** *Transmissivity,* ***S.I.*** *Surface Intensity,* ***CHL*** *Chlorophyll a,* ***PHAEO*** *Phaeophytin,* ***PROD INDEX*** *Productivity Index,* ***O2*** *Oxygen,* **µM** micromole/kg

Date GMT:	Mar 29, 2012 10:19	**Cruise:**	S112	**Latitude:**	35.876	**Year:**	2012
Project:	PACOOS	**Station:**	NPS6	**Longitude:**	-124.022	**Work week:**	13
Platform:	POINT SUR	**Cast:**	13	**Secchi Depth:**	---	**Day of Year:**	89

** Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.*

P h y s i c a l a n d C h e m i c a l

DEP (m)	PRESS (db)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANS (%)	NO3 (µM)	NO2 (µM)	NH4 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l^{-1})
0	2.3	12	12.530	32.881	24.843	85	0.14	0.00	---	0.37	3.13	6.02
50	51.4	11	11.774	32.910	25.009	87	0.99	0.06	---	0.66	3.74	5.97
100	99.8	10	10.448	33.164	25.444	88	10.93	0.00	---	1.14	9.17	5.14
200	199.7	9	8.225	33.898	26.378	88	29.82	0.00	---	2.25	35.33	2.58
300	304.0	8	6.756	34.011	26.676	88	36.29	0.00	---	2.71	53.68	1.77
400	404.1	7	5.989	34.070	26.824	88	39.76	0.00	---	3.06	68.18	1.09
500	506.2	6	5.129	34.104	26.955	88	42.35	0.00	---	3.26	83.95	0.80
600	605.2	5	4.845	34.230	27.088	88	43.81	0.00	---	3.42	96.50	0.30
700	709.5	4	4.583	34.341	27.206	88	44.94	0.00	---	3.59	105.35	0.20
800	806.9	3	4.295	34.393	27.279	88	45.53	0.00	---	3.57	111.98	0.24
900	908.3	2	4.107	34.430	27.329	88	45.71	0.00	---	3.56	116.87	0.31
1000	1012.6	1	3.817	34.460	27.383	88	45.76	0.00	---	3.56	121.59	0.41

** Abbreviations:* ***DEP*** *Depth,* ***PRESS*** *Pressure,* ***BTL*** *Bottle,* ***TEMP*** *Temperature,* ***SAL*** *Salinity,* ***TRANSMISS*** *Transmissivity,* ***S.I.*** *Surface Intensity,* ***CHL*** *Chlorophyll a,* ***PHAEO*** *Phaeophytin,* ***PROD INDEX*** *Productivity Index,* ***O2*** *Oxygen,* **µM** micromole/kg

Date GMT:	Mar 29, 2012 12:26	**Cruise:**	S112	**Latitude:**	35.791	**Year:**	2012
Project:	PACOOS	**Station:**	67-80	**Longitude:**	-124.198	**Work week:**	13
Platform:	POINT SUR	**Cast:**	14	**Secchi Depth:**	14	**Day of Year:**	89

** Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.*

Physical and Chemical

DEP (m)	PRESS (db)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANS (%)	NO3 (µM)	NO2 (µM)	NH4 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l^{-1})
0	1.6	12	13.020	32.972	24.818	86	0.02	0.00	0.04	0.45	2.61	5.87
5	5.2	11	13.017	32.972	24.819	86	0.01	0.00	0.04	0.50	2.25	5.91
10	10.1	10	13.000	32.974	24.824	86	0.01	0.00	0.04	0.46	2.24	5.90
20	19.9	9	12.904	32.976	24.844	85	0.02	0.00	0.04	0.43	2.18	5.89
30	31.0	8	12.883	32.974	24.848	86	0.01	0.00	0.05	0.50	2.16	5.90
40	40.0	7	12.832	32.965	24.851	86	0.05	0.00	0.06	0.52	2.17	5.90
60	60.0	6	12.323	32.898	24.898	87	0.40	0.03	0.17	0.44	2.47	5.94
80	79.6	5	11.852	32.846	24.946	87	1.09	0.08	0.17	0.53	3.06	5.97
100	99.8	4	10.829	33.054	25.293	87	7.14	0.03	0.04	0.87	6.62	5.52
150	151.6	3	9.124	33.497	25.924	87	20.80	0.00	0.04	1.63	20.08	4.11
200	201.7	2	8.472	33.910	26.350	88	26.73	0.00	0.04	1.96	30.56	3.08
1000	1011.0	1	3.821	34.454	27.378	87	45.49	0.00	0.05	3.47	122.40	0.39

Biological

DEP (m)	BTL #	CHL (mg m^{-3})	PHAEO (mg m^{-3})	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m^{-3})	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	0.229	0.104	0	100	7.448	32.541	0
5	11	0.224	0.088	5	50	9.619	42.975	9
10	10	0.222	0.096	10	30	8.115	36.531	16
20	9	0.269	0.095	20	15	8.356	31.033	25
30	8	0.263	0.122	20	5	4.130	15.340	38
40	7	0.312	0.136	40	1	1.577	5.051	57
60	6	0.256	0.164	60	0.1	0.257	1.006	87
80	5	0.219	0.154					
100	4	0.057	0.084					
150	3	0.014	0.053					
200	2	0.019	0.043					
1000	1	0.003	0.019					

Integrated Values *Integrated to 1.0% of Surface Intensity (S.I.)*

Chlorophyll *a:*	14.94	mg m^{-2}	Carbon Fixation:	350.54	mg m^{-2}
Phaeophytin:	5.84	mg m^{-2}	Productivity Index:	23.46	

** Abbreviations:* ***DEP*** *Depth,* ***PRESS*** *Pressure,* ***BTL*** *Bottle,* ***TEMP*** *Temperature,* ***SAL*** *Salinity,* ***TRANSMISS*** *Transmissivity,* ***S.I.*** *Surface Intensity,* ***CHL*** *Chlorophyll a,* ***PHAEO*** *Phaeophytin,* ***PROD INDEX*** *Productivity Index,* ***O2*** *Oxygen,* **µM** micromole/kg

Date GMT:	Mar 29, 2012 15:10	**Cruise:**	S112	**Latitude:**	35.709	**Year:**	2012
Project:	PACOOS	**Station:**	NPS7	**Longitude:**	-124.378	**Work week:**	13
Platform:	POINT SUR	**Cast:**	15	**Secchi Depth:**	---	**Day of Year:**	89

** Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.*

P h y s i c a l a n d C h e m i c a l

DEP (m)	PRESS (db)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANS (%)	NO3 (µM)	NO2 (µM)	NH4 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l^{-1})
0	1.8	12	12.948	32.909	24.784	86	0.16	0.02	---	0.39	2.78	5.94
50	50.4	11	11.827	32.815	24.926	86	0.83	0.05	---	0.54	2.94	6.06
100	102.6	10	11.058	33.010	25.218	87	7.51	0.08	---	0.97	6.86	5.71
200	202.5	9	8.632	33.881	26.303	87	27.06	0.02	---	2.07	29.48	2.86
300	303.3	8	7.343	34.053	26.629	88	29.68	0.00	---	2.38	41.04	1.71
400	406.3	7	6.066	34.082	26.823	88	39.48	0.01	---	2.96	67.70	1.06
500	505.2	6	5.455	34.151	26.954	88	---	---	---	---	---	0.60
600	608.6	5	5.179	34.249	27.065	88	40.73	0.01	---	3.35	84.91	0.30
700	707.2	4	4.773	34.313	27.162	88	43.97	0.00	---	3.34	99.10	0.20
800	810.8	3	4.437	34.387	27.259	88	43.98	0.01	---	3.44	107.43	0.22
900	911.6	2	4.126	34.424	27.322	87	44.87	0.00	---	3.47	117.90	0.29
1000	1013.8	1	3.816	34.454	27.378	87	45.23	0.00	---	3.49	121.79	0.41

** Abbreviations:* ***DEP*** *Depth,* ***PRESS*** *Pressure,* ***BTL*** *Bottle,* ***TEMP*** *Temperature,* ***SAL*** *Salinity,* ***TRANSMISS*** *Transmissivity,* ***S.I.*** *Surface Intensity,* ***CHL*** *Chlorophyll a,* ***PHAEO*** *Phaeophytin,* ***PROD INDEX*** *Productivity Index,* ***O2*** *Oxygen,* **µM** micromole/kg

Date GMT:	Mar 29, 2012 17:09	**Cruise:**	S112	**Latitude:**	35.626	**Year:**	2012
Project:	PACOOS	**Station:**	67-85	**Longitude:**	-124.555	**Work week:**	13
Platform:	POINT SUR	**Cast:**	16	**Secchi Depth:**	13	**Day of Year:**	89

** Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.*

Physical and Chemical

DEP (m)	PRESS (db)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANS (%)	NO3 (µM)	NO2 (µM)	NH4 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l^{-1})
0	1.5	12	12.464	32.824	24.812	84	0.29	0.02	0.05	0.44	3.28	6.07
5	5.1	11	12.384	32.825	24.828	84	0.31	0.07	0.04	0.62	2.76	6.09
10	10.7	10	12.346	32.823	24.834	84	0.40	0.06	0.04	0.63	2.67	6.09
20	20.3	9	11.882	32.804	24.907	83	0.64	0.06	0.04	0.54	3.34	6.15
30	30.0	8	11.847	32.807	24.915	84	0.73	0.04	0.05	0.51	3.12	6.12
40	41.2	7	11.778	32.810	24.931	85	1.16	0.04	0.08	0.54	3.28	6.10
60	61.5	6	11.579	32.879	25.022	87	2.71	0.14	0.17	0.61	4.19	6.02
80	81.8	5	11.139	33.027	25.216	87	4.95	0.30	0.16	0.82	5.89	5.91
100	101.7	4	10.418	33.061	25.370	87	9.35	0.05	0.04	1.06	8.37	5.44
150	151.8	3	8.696	33.553	26.035	87	21.74	0.04	0.05	1.76	23.44	4.09
200	201.7	2	8.394	33.918	26.368	88	26.51	0.02	0.05	1.97	30.49	3.29
1000	1010.5	1	3.891	34.451	27.369	87	---	---	0.05	---	---	0.38

Biological

DEP (m)	BTL #	CHL (mg m^{-3})	PHAEO (mg m^{-3})	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m^{-3})	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	0.525	0.097	0	100	27.070	51.558	0
5	11	0.517	0.154	5	50	22.038	42.588	7
10	10	0.555	0.139	10	30	28.154	50.773	12
20	9	0.652	0.138	10	15	21.061	37.982	18
30	8	0.639	0.264	20	5	8.771	13.450	28
40	7	0.565	0.220	40	1	1.974	3.496	43
60	6	0.257	0.169	60	0.1	0.042	0.164	68
80	5	0.121	0.103					
100	4	0.040	0.075					
150	3	0.009	0.033					
200	2	0.009	0.024					
1000	1	0.002	0.019					

Integrated Values *Integrated to 1.0% of Surface Intensity (S.I.)*

Chlorophyll *a:*	24.68	mg m^{-2}	Carbon Fixation:	677.44	mg m^{-2}
Phaeophytin:	6.47	mg m^{-2}	Productivity Index:	27.45	

** Abbreviations:* ***DEP*** *Depth,* ***PRESS*** *Pressure,* ***BTL*** *Bottle,* ***TEMP*** *Temperature,* ***SAL*** *Salinity,* ***TRANSMISS*** *Transmissivity,* ***S.I.*** *Surface Intensity,* ***CHL*** *Chlorophyll a,* ***PHAEO*** *Phaeophytin,* ***PROD INDEX*** *Productivity Index,* ***O2*** *Oxygen,* **µM** micromole/kg

Date GMT:	Mar 29, 2012 19:44	**Cruise:**	S112	**Latitude:**	35.542	**Year:**	2012
Project:	PACOOS	**Station:**	NPS8	**Longitude:**	-124.729	**Work week:**	13
Platform:	POINT SUR	**Cast:**	17	**Secchi Depth:**	---	**Day of Year:**	89

** Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.*

P h y s i c a l a n d C h e m i c a l

DEP (m)	PRESS (db)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANS (%)	NO3 (µM)	NO2 (µM)	NH4 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l^{-1})
0	1.7	12	13.441	32.981	24.741	86	0.00	0.01	---	0.39	2.64	5.89
50	49.5	11	11.921	32.815	24.908	85	0.48	0.04	---	0.52	3.08	6.10
100	99.9	10	10.972	32.955	25.190	87	6.73	0.17	---	0.87	6.95	5.82
200	202.9	9	8.570	33.865	26.300	87	21.58	0.02	---	1.87	24.46	3.51
300	303.0	8	7.187	33.980	26.594	88	31.33	0.01	---	2.39	46.02	2.40
400	403.6	7	6.109	34.043	26.787	88	37.30	0.00	---	2.90	65.31	1.35
500	501.7	6	5.558	34.153	26.943	88	40.11	0.00	---	3.22	80.34	0.62
600	604.5	5	5.137	34.237	27.060	88	41.61	0.00	---	3.42	91.71	0.32
700	706.0	4	4.814	34.331	27.173	88	42.66	0.00	---	3.51	100.47	0.20
800	807.5	3	4.421	34.388	27.261	88	43.24	0.01	---	3.49	110.41	0.23
900	909.6	2	4.105	34.428	27.328	87	43.57	0.00	---	3.55	116.64	0.30
1000	1014.7	1	3.806	34.467	27.389	87	43.65	0.01	---	3.51	123.06	0.43

** Abbreviations:* ***DEP*** *Depth,* ***PRESS*** *Pressure,* ***BTL*** *Bottle,* ***TEMP*** *Temperature,* ***SAL*** *Salinity,* ***TRANSMISS*** *Transmissivity,* ***S.I.*** *Surface Intensity,* ***CHL*** *Chlorophyll a,* ***PHAEO*** *Phaeophytin,* ***PROD INDEX*** *Productivity Index,* ***O2*** *Oxygen,* **µM** micromole/kg

Date GMT:	Mar 29, 2012 21:47	**Cruise:**	S112	**Latitude:**	35.459	**Year:**	2012
Project:	PACOOS	**Station:**	67-90	**Longitude:**	-124.907	**Work week:**	13
Platform:	POINT SUR	**Cast:**	18	**Secchi Depth:**	24	**Day of Year:**	89

** Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.*

Physical and Chemical

DEP (m)	PRESS (db)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANS (%)	NO3 (µM)	NO2 (µM)	NH4 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l^{-1})
0	1.8	12	13.344	32.917	24.711	86	0.02	0.02	0.04	0.37	2.86	5.94
5	5.7	11	13.056	32.931	24.780	86	---	---	---	---	---	5.94
10	9.3	10	12.928	32.938	24.810	85	0.00	0.02	0.04	0.40	2.46	5.93
20	20.5	9	12.863	32.949	24.832	85	0.04	0.00	0.04	0.52	2.36	5.94
30	30.2	8	12.856	32.951	24.835	85	0.01	0.01	0.05	0.43	2.40	5.93
40	39.7	7	12.845	32.954	24.840	85	0.12	0.01	0.07	0.47	2.40	5.94
60	60.2	6	12.569	32.939	24.882	86	0.29	0.04	0.14	0.49	2.55	5.94
80	81.2	5	11.696	32.851	24.979	87	1.49	0.12	0.29	0.56	3.47	5.97
100	99.5	4	11.249	32.927	25.120	87	4.52	0.20	0.20	0.74	5.46	5.92
150	150.9	3	9.160	33.418	25.857	87	19.09	0.03	0.04	1.56	19.08	4.31
200	203.7	2	8.523	33.882	26.321	87	23.58	0.03	0.05	1.80	26.99	3.75
200	203.0	1	8.531	33.880	26.318	87	23.70	0.02	0.05	1.76	27.28	3.82

Biological

DEP (m)	BTL #	CHL (mg m^{-3})	PHAEO (mg m^{-3})	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m^{-3})	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	0.200	0.032	0	100	4.992	24.930	0
10	10	0.206	0.052	10	50	4.538	22.012	10
20	9	0.210	0.057	20	30	6.255	29.856	18
30	8	0.250	0.058	30	15	5.305	21.228	28
40	7	0.319	0.125	40	5	4.011	12.579	42
60	6	0.369	0.138	60	1	0.973	2.635	60
80	5	0.229	0.112	100	0.1	0.078	1.146	90
100	4	0.068	0.054					
150	3	0.012	0.028					
200	2	0.007	0.020					

Integrated Values *Integrated to 1.0% of Surface Intensity (S.I.)*

Chlorophyll *a:*	16.17	mg m^{-2}	Carbon Fixation:	257.15	mg m^{-2}
Phaeophytin:	5.10	mg m^{-2}	Productivity Index:	15.90	

** Abbreviations:* ***DEP*** *Depth,* ***PRESS*** *Pressure,* ***BTL*** *Bottle,* ***TEMP*** *Temperature,* ***SAL*** *Salinity,* ***TRANSMISS*** *Transmissivity,* ***S.I.*** *Surface Intensity,* ***CHL*** *Chlorophyll a,* ***PHAEO*** *Phaeophytin,* ***PROD INDEX*** *Productivity Index,* ***O2*** *Oxygen,* **µM** micromole/kg

Date GMT:	Mar 29, 2012 23:02	**Cruise:**	S112	**Latitude:**	35.458	**Year:**	2012
Project:	PACOOS	**Station:**	67-90 DEEP	**Longitude:**	-124.908	**Work week:**	13
Platform:	POINT SUR	**Cast:**	19	**Secchi Depth:**	---	**Day of Year:**	89

** Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.*

P h y s i c a l a n d C h e m i c a l

DEP (m)	PRESS (db)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANS (%)	NO3 (µM)	NO2 (µM)	NH4 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l^{-1})
5	5.2	12	13.271	32.939	24.743	86	0.00	0.01	---	0.40	2.87	5.91
100	104.6	11	11.476	32.934	25.084	87	2.88	0.18	---	0.67	4.86	5.92
250	255.9	10	7.848	33.957	26.481	87	29.60	0.02	---	2.21	38.07	2.52
500	508.2	9	5.371	34.112	26.933	87	40.27	0.01	---	3.09	79.00	0.79
700	760.4	8	4.371	34.315	27.208	87	43.30	0.02	---	3.45	108.94	0.20
1000	1015.6	7	3.832	34.465	27.386	87	43.70	0.01	---	3.49	122.63	0.44
1500	1520.4	6	2.743	34.557	27.564	88	42.91	0.02	---	3.42	150.14	0.98
2000	2026.8	5	2.056	34.613	27.668	88	41.48	0.01	---	3.31	168.56	1.46
2500	2537.5	4	1.756	34.648	27.722	88	39.92	0.02	---	3.11	173.15	1.87
3000	3049.8	3	1.600	34.666	27.751	88	39.07	0.02	---	3.11	174.75	2.27
3500	3564.6	2	1.502	34.680	27.773	88	38.02	0.02	---	3.04	171.50	2.62
4000	3991.2	1	1.492	34.686	27.782	88	37.70	0.01	---	2.94	167.51	2.83

** Abbreviations:* ***DEP*** *Depth,* ***PRESS*** *Pressure,* ***BTL*** *Bottle,* ***TEMP*** *Temperature,* ***SAL*** *Salinity,* ***TRANSMISS*** *Transmissivity,* ***S.I.*** *Surface Intensity,* ***CHL*** *Chlorophyll a,* ***PHAEO*** *Phaeophytin,* ***PROD INDEX*** *Productivity Index,* ***O2*** *Oxygen,* **µM** micromole/kg

Appendix B

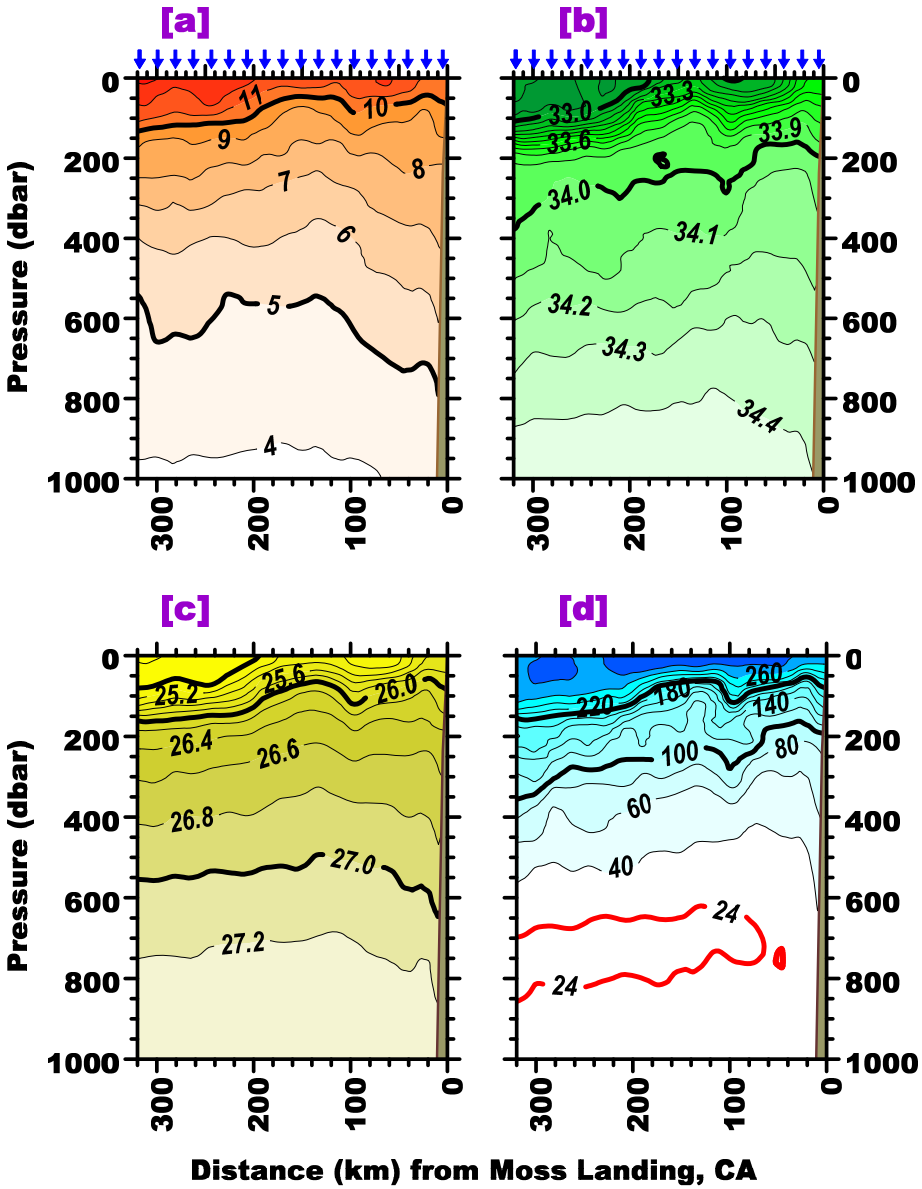

Figure 10: *Contours of* ***(a)*** *temperature (°C),* ***(b)*** *salinity,* ***(c)*** *density anomaly (kg m^{-3}), and* ***(d)*** *oxygen (μmol kg^{-1}) fields along the line of hydrographic stations from Moss Landing, California, (on the right) to CalCOFI station 67-90 (on the left).* The blue arrows along the top axes in the upper two panels indicate the locations of CTD casts. Contour intervals for panels a-d are 1°C, 0.1, 0.2 kg m^{-3}, and 20 μmol kg^{-1}, respectively, except that the (nearly) oxygen minimum contour of 24 μmol kg^{-1} is highlighted in red in panel d. Other highlighted contours are 5° and 10°C (upper left), 33 and 34 (upper right), 25, 26, and 27 kg m^{-3} (lower left), and 100 and 200 μmol kg^{-1} (lower right).

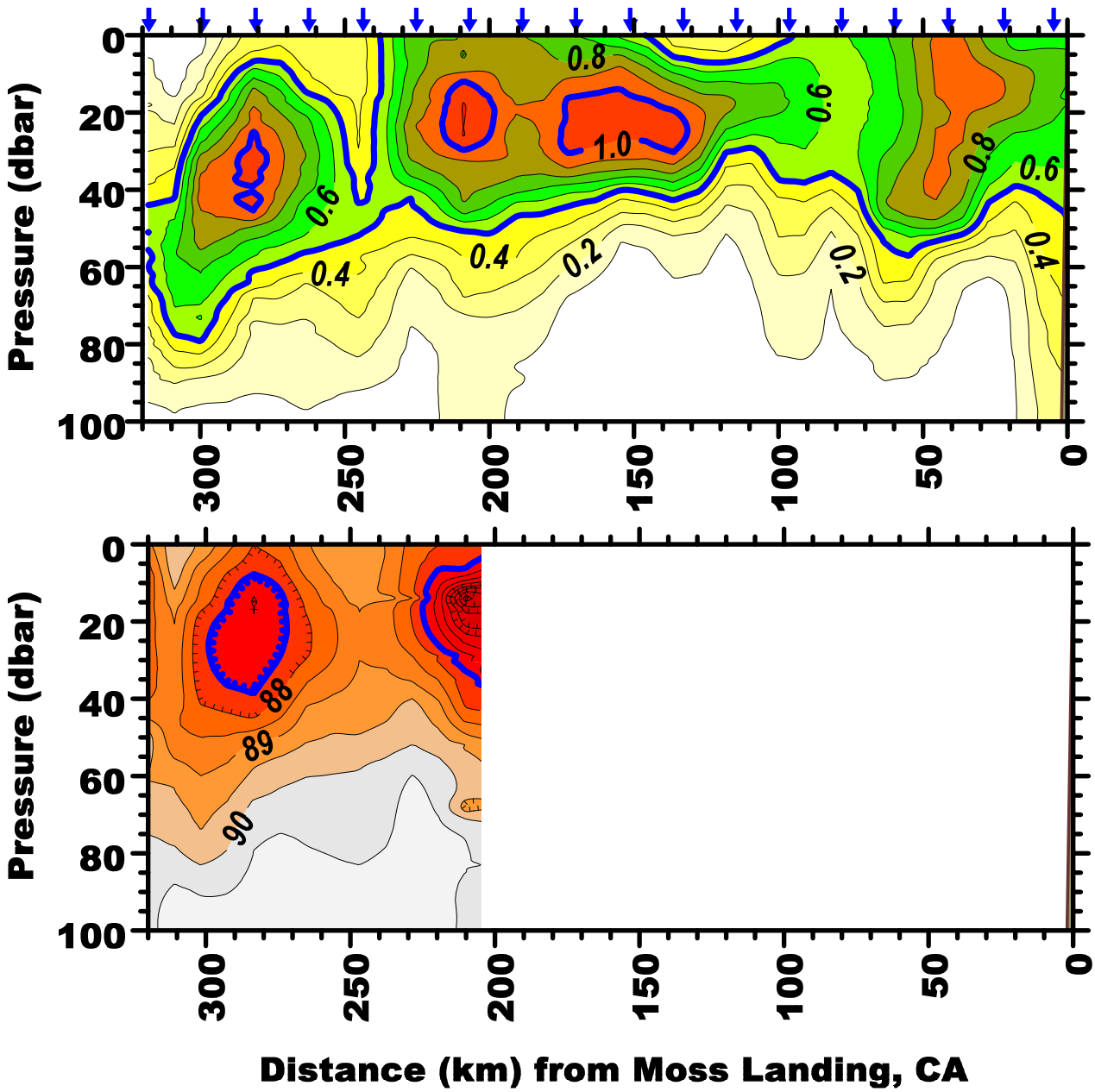

Figure 11: *Contours of fluorescence (μg l^{-1}) **[top]** and transmissivity (percentage) **[bottom]** in the upper 100 dbars of the water column along the line of hydrographic stations from Moss Landing, California, (on the right) to CalCOFI station 67-90 (on the left).* The blue arrows along the top axis in the upper panel indicate the locations of CTD casts. There were no good transmissivity data until 205 km from Moss Landing, CA. (See text.) The contour intervals are 0.1 μg l^{-1} for the top panel and 0.5 percent for the bottom panel. 0.5 and 1.0 μg l^{-1} (top) and 87.5% (bottom) contours are highlighted. Hatched contours indicate "depressions."

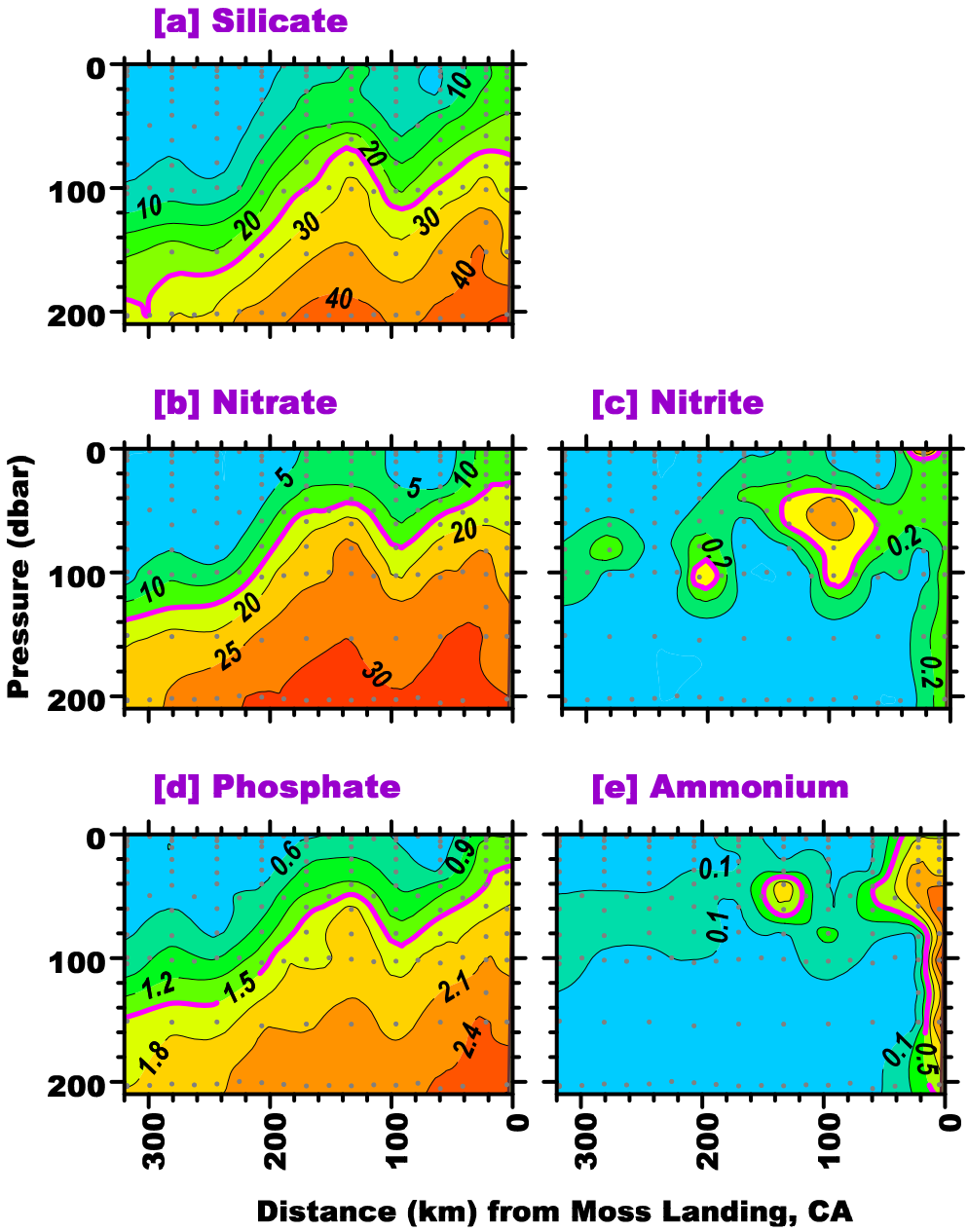

Figure 12: *Contours of* ***(a)*** *silicate (μM),* ***(b)*** *nitrate (μM),* ***(c)*** *nitrite (μM),* ***(d)*** *phosphate (μM), and* ***(e)*** *ammonium (μM) fields along the line of hydrographic stations from Moss Landing, California, (on the right) to CalCOFI station 67-90 (on the left).* The dots indicate the water sample locations. Contour intervals for panels a-e are 5 μM, 5 μM, 0.1 μM, 0.3 μM, and 0.2 μM, respectively. Highlighted contours are 25 μM, 15 μM, 0.3 μM, 1.5 μM, and 0.5 μM for panels a-e, respectively.

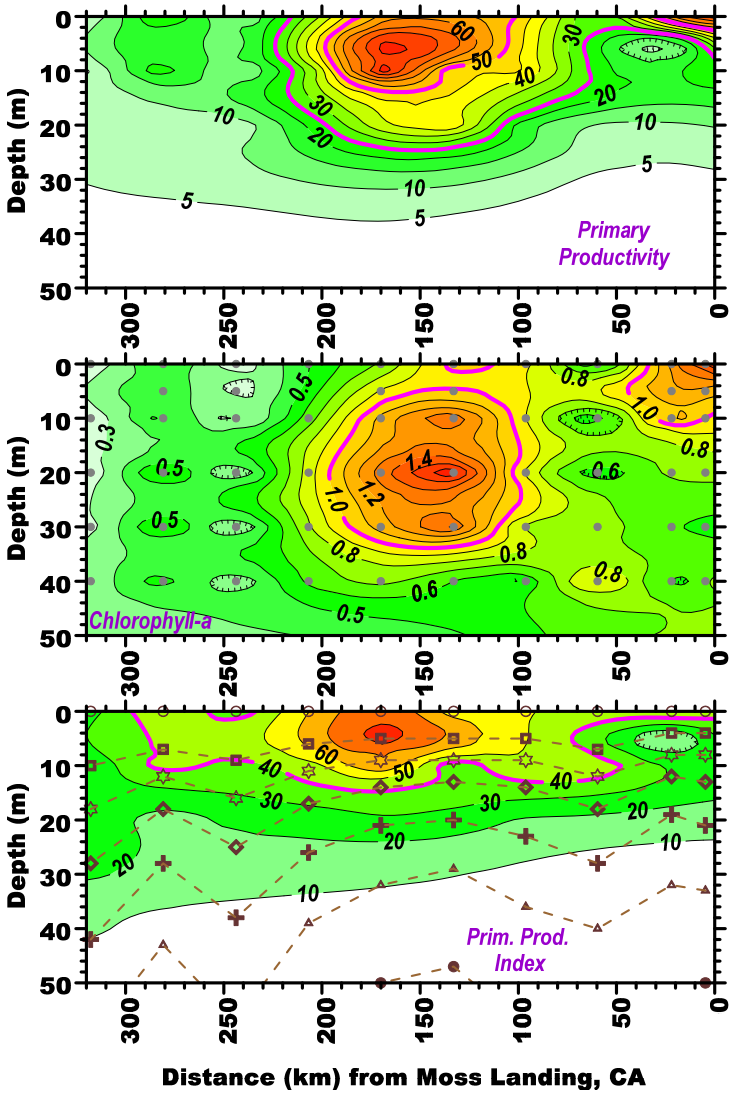

Figure 13: *Contours of primary productivity (mg Carbon m^{-3}) [**top**], chlorophyll-a (mg m^{-3}) [**middle**], and primary productivity index (ratio of mg Carbon m^{-3} to mg Chlorophyll-a m^{-3}) [**bottom**] in the upper 50 m of the water column along the line of hydrographic stations from Moss Landing, California, (on the right) to CalCOFI station 67-90 (on the left).* Dots [**middle**] indicate the water sample locations for chl-*a*. Primary productivity samples are taken by the percentage of the surface light intensity level (light penetration depth). (Light penetration) depths of those light intensity levels are shown [**bottom**] by the various symbols, with like symbols connected by dashed lines. (100% = open circles, 50% = open squares, 30% = open stars, 15% = open diamonds, 5% = plusses, 1% = open triangles, 0.1% = filled circles.) The contour intervals are 5 mg C m^{-3}, 0.1 mg m^{-3}, and 10, respectively, for the top, middle, and bottom panels. Other highlighted contours are 25 and 50 mg C m^{-3} [**top**], 1 mg m^{-3} [**middle**], and 40 [**bottom**].

Appendix C

The following is the introduction from the manual for the SeaTech transmissometer that was mounted on the CTD during the PaCOOS cruise of March 2012.

The Sea Tech 25 cm pathlength transmissometer has been designed to provide accurate in situ measurements of beam transmission and the concentration of suspended matter in relatively clear waters.

The two basic processes that alter the underwater distribution of light are absorption and scattering. Absorption is a change of light energy into other forms of energy whereas scattering entails a change in direction of the light without loss of energy.

In a pure absorbing medium, the loss of light due to absorption in a well-collimated beam of monochromatic light will be given by $I(z)= I(o)e^{-az}$, where "a" is the absorption coefficient with units of m^{-1}. Similarly, in a pure scattering medium, the light redirected from a well-collimated beam of monochromatic light will be given by $I(z) = I(o)e^{-bz}$, where "b" is the volume scattering coefficient with units of m^{-1}. Since attenuation is defined as the sum of absorption and scattering, we get a + b = c, where "c" is the beam attenuation coefficient.

The light lost from a well-collimated monochromatic beam of light in a scattering and absorbing medium is thus given by $I(z) = I(o)e^{-cz}$. This can be rewritten as $T(z)=I(z)/I(o) = e^{-cz}$, where T(z) is the percent light transmitted over a distance, "z". It should be noted that transmission is always over a given distance, whereas the beam attenuation coefficient, "c", is independent of distance. "c" is computed by -ln(T)/z, where z is the pathlength of the instrument.

The simple exponential relationship holds only if the light is monochromatic. The Sea Tech transmissometer employs a light emitting diode (LED) light source with a wavelength of 660 nm, which is in the red part of the spectrum. This LED is nearly monochromatic.

A beam attenuation coefficient, "c", can be divided into three parts: 1) That due to water, c_w; 2) that due to suspended particulate matter, c_p; and 3) that due to dissolved materials (mostly humic acids or "yellow matter"), c_y. Hence, $c=c_w+c_p+c_y$. Each of these components has distinct spectral characteristics. Yellow matter absorbs strongly in the blue part of the spectrum. This absorption decreases exponentially with increasing wavelengths. The beam attenuation coefficient for particulate matter is much less wavelength dependent. It varies approximately as λ^{-1}. The attenuation spectrum of natural waters is a composite of the three components, depending on the relative concentrations. The yellow matter is a by-product of organic decay and can be present in large amounts in lakes, reservoirs, and near-shore waters. At 660 nm, the attenuation of yellow matter is negligible, however, so that the attenuation is due to particulate matter and sea water only.

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